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Contractors and Engineers Monthly

Vol. 39, No. 2 FEBRUARY, 1942 $2 a Year, 20 Cents a Copy

ROADS TO VICTORY

Highlights Of This Issue

- **The Highway Outlook**
  The change from the defense program to all-out war production requires a new emphasis on highways. Under the title "Roads to Victory" are three articles discussing the highway needs and type of work to be done, how priorities and allocations affect the highway industry, and the equipment and parts service outlook for 1942.
  See page 1.
- **Defense Construction**
  America's construction industry paves the way, figuratively and literally, for our tremendous war effort. The articles in this issue on construction for defense include descriptions of grading and paving two sections of an access road to a new aircraft manufacturing and assembly plant and the paving of test runways at the plant.
  See page 2.
- **County Aids War Effort**
  Counties, too, have a great contribution to make in keeping vital war supplies moving over the highways. An example is Marquette County, Mich., where many mines are located, which means that the County Highway Department must keep the roads in condition and open to traffic the year round, regardless of temperature or weather.
  See page 2.
- **Pouring Bridge Piers**
  Features of the work on the substructure for the new 4,972-foot steel bridge across the Illinois River at Peoria included novel pier forms and bracing, and concreting from a floating plant.
  See page 15.
- **Penetration Paving**
  The penetration bases and surface for a 6-mile grading, drainage and paving contract on U. S. 44 in Connecticut are described in this issue.
  See page 19.

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Highways of Paramount Importance; Must Provide Wide Variety of Service

Problems of Road Work To Care For Increased Traffic Discussed by Highways Officials

✦ THE highways of America must be the Victory Highways of the world, constructed, bridged and maintained to carry the Army to combat, naval and military supplies to bases and airports, and products of the soil to civilian markets without delay, all without destroying the roads. The confining of Federal Aid to the military strategic network and access roads, the cutting off of our rubber supply and the sterilizing of the new car market, which will reduce the life-blood of gas-tax income for highway work, present a very real menace to our victory effort. The armed forces of the democracies need everything we can supply them in air, sea and land transports and in the munitions of war, but to make this possible we must have three strategic networks at home capable of

(*Continued on page 8*)

New Emphasis on Highways

Both the military and civilian war programs place a premium on an adequately maintained highway system. Neglect here would be suicidal. The dominant position of rail transportation in time of war came to an end with the creation of panzer divisions. Poland and France will long remember this.

As the present all-out war effort expands, a new emphasis on the importance of highways will displace the comparative absence of concern which characterized the "defense" program.

—William J. Casey

Priorities Aim to Insure Adequate Equipment and Materials for Necessary Highway Activities

By WILLIAM J. CASEY, Chairman, Board of Editors, Research Institute of America, Inc.

✦ THE mechanism of priorities and allocations, an inevitable economic counterpart of modern warfare, has created more confusion, been surrounded with more mystery, and caused more severe industrial dislocations than anything which ever struck business. Whether an individual business survives or starves will depend upon our understanding of the operation of allocations and priorities, and the industry's ability to fit into that area in which these controls allow materials to circulate.

Modern warfare is a contest between economic systems in fully as real a sense as it is between military forces. In fact.

(*Continued on page 20*)

"KEEP 'EM ROLLING" IS ORDER OF THE DAY

Equipment Manufacturers Are Doing Their Utmost; Care of Present Machines Assumes New Importance

✦ THE road to Victory lies in the most tremendous all-out production effort the world has ever seen, most of it in the United States, the arsenal of democracy. Every American is whole-heartedly behind this effort, ready and willing to make the necessary sacrifices to achieve final and complete victory, but every reader of CONTRACTORS AND ENGINEERS MONTHLY is also concerned with the effect of this all-out production on the way he carries on his job, which in itself is a major contribution to the national effort. Contractors working on various types of construction and state and county highway engineers are charged with the responsibility of "keeping 'em moving," and they naturally want to know just what is the outlook for securing the necessary equipment and

(*Continued on page 22*)

C. & E. M. Photo
Mixing a windrow with a Seaman Pulvi-Mixer on a state highway in Barron County, Wisconsin. See page 28.

C. & E. M. Photo
A Kinney 2,500-gallon distributor shooting a strip 13 feet wide on the M. A. Gammino paving job in Connecticut. See page 19.

The floating concreting plant pouring the seal for Pier 13 of the Illinois River Bridge at Peoria, Ill. See page 15.

A part of the effective snow plowing fleet of Marquette County, Mich., at work. See page 2.

Roads and Runways To Serve Bomber Plant

Tournapulls and Carryalls, Elevating Grader Loading To Euclids all Work for Defense on Nebraska Job

(*Photo on page 56*)

✦ THE seemingly impregnable array of project numbers, AI-138-A (3), SN-138-C (2), AI-138-E (2) and AI-388 (3) did not deter Peter Kiewit Sons' Co. of Omaha, Nebraska, when it came to shifting grading units from one end of the 6 miles of grading to the other on which 535,980 cubic yards of loess was moved on an access road leading to a new aircraft manufacturing and assembly plant. One day the Tournapulls were on 388 (3), the Caterpillar 48-inch elevating grader and Euclids on the north end of 138-A (3) and the Carryalls on the south end. The next day, because of moisture changes, those operations were to be abandoned and the work taken up a mile or so away.

The Tournapull Team

The squad of Tournapulls consisted of four Model C Tournapulls with Model LP Carryalls with which, part of the time, were operated two 27-yard Carryalls pulled by D8 tractors. These units worked three 7-hour shifts to move the dirt in fast time so that this defense highway giving access to an important training center and industrial plant could be served adequately by highway as well as by railroad. The shifts were from 5 a.m. to 12 noon, from 12 to 7 p.m. and from 7 p.m. to 2 a.m.

For loading in the pit, two D8 pushers were maintained when the outfit was working on a 700-foot haul. On the other end of the line where the material was being spread in uniform 6-inch layers before rolling, compaction was secured with a double Bros sheepsfoot roller when the dirt was rather moist and with flat rollers when it was dry. The flat rollers were two McCormick-Deering tractors with loaded rear wheels 2 feet wide and weighing 13,200 pounds gross on the rear wheel. A No. 12 Caterpillar power grader worked on the fill, trimming the slopes and doing any general work required in spreading the layers to aerate them if the material was a little too wet. This outfit worked under Jay Martin as Foreman.

Elevating to Euclids

At the time of our visit, the elevating grader and Euclids were working on one side of a 6,210-foot balance and a covey of Carryalls was working on the opposite side. The big cut ran 138,981 cubic yards of excavation, going into 110,734 cubic yards of embankment, with the balance figured by the state highway department as 1.26 cubic yards of cut for each cubic yard of compacted fill. This was a moisture-controlled job

(*Concluded on page 13*)

C. & E. M. Photo
Grading on a mid-west industrial access road was continued in three 7-hour shifts by Peter Kiewit Sons' Co., contractor on the job.

A 1.7-Mile Concrete Access Road, Relocating State Highway, Constructed by Peter Kiewit Sons' Co.

(*Photo on page 56*)

✦ TO furnish adequate traffic facilities to the east entrance of an army post as well as additional access to a new aircraft plant in the wid-west, the state highway department built 1.7 miles of 22-foot concrete pavement in the late summer of 1941 as an industrial access road under the Federal-Aid secondary-road appropriation. The route is a relocation of a state highway through a yel-

(*Continued on page 12*)

Kiewit-Condon-Woods Paves Asphalt-Emulsion Runways For Testing Army Bombers At Mid-West Plant

(*Photo on page 56*)

✦ FOR testing and delivering the bombers to be built at a new Aircraft Assembly Plant in the middle west, the U.S. Engineer Office, Omaha District, built three runways with an 8-inch sand-gravel base course stabilized with asphalt emulsion and surfaced with a 2-inch hot-mixed asphaltic-concrete wearing course. The contract for this work was awarded to Kiewit-Condon-Woods Construction Co. of Omaha. As this is a new type of construction in the Omaha District, unusual care was taken to secure the best results. This included an asphalt consultant, slight revisions in specifications and methods, and constant careful inspection.

The three runways are each 150 feet wide and are 5,700 feet, 4,700 feet and 4,300 feet in length. The emulsion-stabilized base was placed in two 4-inch layers to form a compacted 8-inch base. This was a revision in the original specifications which required two 3-inch layers and a top layer of 2 inches. It was found soon after the work started that adequate compaction could be secured on a 4-inch layer by the sheepsfoot rolling. This also speeded the work and made it a more economical operation.

Preparing the Subgrade

It was the intention to bring the sub-

(*Continued on page 26*)

The rear of the soil-cement spreader, showing the teeth set in a heavy wood beam to loosen material behind the crawlers.

Soil-Cement Base Was Plant-Mixed

Mittry Bros. Had 6.3-Mile Contract for Soil-Cement Base and Black-Top Surface On New California Road

By RALPH BAKER

(*Photos on page 56*)

✦ CALIFORNIA'S Division of Highways has done considerable pioneering in the development of soil-cement roads, and their latest work in this field of construction involves some interesting features of extra heavy construction and the methods of plant mixing and placing of the soil-cement, the latter being different from any previously used in this part of the west. The contract, which was awarded to Mittry Bros. Construction Co., Los Angeles, for $200,000, is a 6.3-mile cut-off being built between Coast Highway 101 near Corona Del Mar northward to join Newport Boulevard about 3 miles south of Santa Ana.

The new road cuts across a corner of the huge Irvine Ranch, an old Spanish land grant, in a practically straight line unobstructed by cross roads or even a farm lane, and will form a freeway which will greatly facilitate the movement of traffic between San Diego and Los Angeles, passing close by the new location of a municipal airport.

The specifications called for a graded roadbed 84 feet wide on the northern 2.7 miles of the project, and 70-feet wide the remainder of the distance. On the 70-foot section were laid two 23-foot lanes of 8-inch thick soil-cement topped with 3 inches of plant-mixed asphalt. The two lanes are divided by a 6-foot strip of bituminous surface treatment 0.25 foot thick. The shoulders adjacent to the traffic lane are 7 feet wide and have a bituminous surface treatment 0.25 foot thick. SC-2 liquid asphalt was used. Dikes were constructed on fills

(*Concluded on page 30*)

County Organization Aids Defense Effort

Marquette County, Mich., Pays Special Attention to Snow Plowing; Safety of School Buses Important

(*Photos on pages 1 and 56*)

✦ DURING an interview with K. I. Sawyer, Engineer-Superintendent of the Marquette County Highway Department, at Ishpeming, in the northern portion of the Upper Peninsula of Michigan, Mr. Sawyer stated with justifiable pride, "We have never lost a school child in Marquette County because a bus could not get through the snow." Considering the severity of northern Michigan winters, with temperatures running 20 below for days at a time and subpeaks of 40 to 45 degrees below, and a snowfall at times leaving 7 feet of rather solid banks, this statement of itself would indicate an unusually well organized highway department. When it is realized that the County, with its 1,874 square miles, is approximately twice the size of the state of Rhode Island and nearly as large as Delaware, one comprehends the magnitude of winter maintenance and year-round operation of the County Highway Department.

In addition to its responsibility to school children in keeping its 1,245 miles of county roads open, Marquette County also maintains under contract 139.9 miles of state roads, including snow plowing. This county is known for its large number of mines, which at present are working 24 hours a day making their contribution to the war effort to which this country is overwhelmingly pledged. Since most of these mines are located on county roads, and both miners and supplies must be moved over the highways, there is added importance to the maintenance operations on these secondary roads, particularly in winter.

Aid for the School Bus

The population of Marquette County is about 47,000, and of this one-third is rural, living partly on farms and rural homesteads and in unincorporated communities usually without a school, so that the operation of a large number of school buses is an essential part of the educational system. Well before each winter, a full analysis is made of all of the bus routes serving the schools, and these are first carefully plotted on a large map of the county for careful study. Following this, a very elaborate tabulation is made, which becomes a

(*Continued on page 16*)

C. & E. M. Photo
This Caterpillar No. 12 power grader is taking its turn with the grease truck on Peter Kiewit Sons' Co. grading job.

Spraying the surface of the soil-cement base with a seal coat of asphalt emulsion on the south end of the job. The lane at the left is ready for the black top.

Answering America's need for more and more Airports

DAY and NIGHT shifts at work on Asphalt runways for the Daytona Beach Airport

Approximately 65,000 tons of Asphaltic Concrete were laid by the Frank Construction Company of Daytona Beach, Fla., on runways of the Daytona Beach airport.

The new 4-runway airport at Daytona Beach, Fla., is an example of the use of Asphalt construction for both base and wearing surface. Runways of this important airport are covered by a 5-inch thickness of resilient Asphalt construction, consisting of a 3½-inch base and 1½-inch surface.

The hot plant-mix type of Asphalt runway used at Daytona Beach stands up successfully under the impact of heavy commercial or military planes. It presents a smooth, but highly skid-resistant surface. Damage to *all-asphalt* runways caused by bombs is quickly and easily repaired. This is especially important today.

TEXACO Asphalt was used in constructing the greater part of the quarter-million square yards of runways which serve the Daytona Beach airport.

TEXACO TEXACO REG. T. M. **ASPHALT**

THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd Street, New York City
Chicago Philadelphia Houston Boston Richmond Jacksonville

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

Member of Controlled Circulation Audit

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Printed in Mount Morris, Ill., U. S. A.

THEODORE REED KENDALL.....Editor — O. E. POTTER.....Managing Editor
EDGAR J. BUTTENHEIM.....President — DONALD V. BUTTENHEIM.....General Manager
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BRANCH OFFICES
Chicago, Ill., Daily News Bldg., George S. Conover, Vice President; John T. Dix
San Francisco, Calif., Mills Bldg., and Los Angeles, Calif., Western Pacific Bldg., Duncan A. Scott & Co.

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Highway Outlook in Wartime
Our Three Strategic Networks

By GENERAL PHILIP B. FLEMING,
Administrator,
Federal Works Agency

The war will bring about a very material reduction in the total volume of road and street construction in the United States. Long needed improvements will have to be abandoned or postponed. This is an additional price we shall have to pay for victory.

A number of factors are combining to bring about curtailment of construction. Revenues for street and highway purposes will be reduced. Shortages of critical materials, especially steel, will continue. Restrictions of various sorts will make equipment difficult to obtain. The supply of labor, particularly skilled labor, will be insufficient. Difficulties and delays in the transportation of all but the most essential military equipment will limit the use of even available materials. Competing demands for the services of contractors will further disrupt highway-construction programs.

The reduction in revenues will result from wartime curtailment of normal Federal expenditures and a lower yield from state motor-vehicle-registration and gasoline taxes. Reduced county and city property taxes also may be anticipated, due to the necessity for taxpayers to meet drastically higher Federal war taxes and for localities to reduce normal expenditures. Expenditure of Federal highway funds and matching state contributions will be strictly limited to construction deemed essential in connection with the war effort and certified as such by military or naval authorities.

Certified improvements of first importance will be those required to provide adequate access to Army and Navy establishments, war-industry plants, and sources of strategically important raw materials. For this construction, special Federal funds have been authorized and appropriated.

Certified improvements of second importance will be those required to condition sections of the strategic highway network and of main state and city arteries heavily traveled by vehicles engaged in the war effort. These will be financed by regular Federal-Aid, state, and local funds. Wherever Federal funds are used, the improvements will be limited to the correction of the most critical deficiencies of the more important routes, with particular emphasis on the strengthening of bridges.

With the postponement of much road and street construction that is not vital to the war effort, maintenance of existing facilities becomes increasingly urgent to support continued highway service of reasonable adequacy. Effective maintenance operations must be adequately financed and supplied.

Useful research also must be con-

(*Concluded on page 31*)

By CHARLES M. UPHAM,
Engineer-Director,
American Road Builders' Association

The greatest contribution that the highway profession and industry can make towards our war effort is to keep our highways in the most satisfactory condition possible.

This nation has pledged itself not only to be an arsenal for the Allies of the world but it has also pledged to supply food, and other human requirements to many countries. In normal times our highway system was quite inadequate to meet traffic demands and this condition has been tremendously aggravated by the increased wartime traffic.

The primary thought of every highway official and engineer today must be to keep our defense highways in the highest degree of efficiency at all times by construction, reconstruction and maintenance.

The highway construction program of this country for 1942 should include only those roads which come within one of the following categories:

1. Highways of strategic military importance.
2. Highways of strategic importance to war production plants.
3. Highways of strategic importance to the proper handling of farm supplies, and other vital civilian needs.

Particular attention must be given to adequate maintenance, in order to as-

(*Concluded on page 49*)

Inter-American Route Funds Appropriated

Preparations for closing the existing gaps in the Inter-American Highway extending from the U.S.-Mexico border to Panama are now under way, following President Roosevelt's approval of an authorization of $20,000,000 which had been voted by Congress for that purpose. To receive the benefit of all of these funds, the Central American republics are to provide a minimum of $10,000,000, making a total construction program of $30,000,000 for a 5-year period.

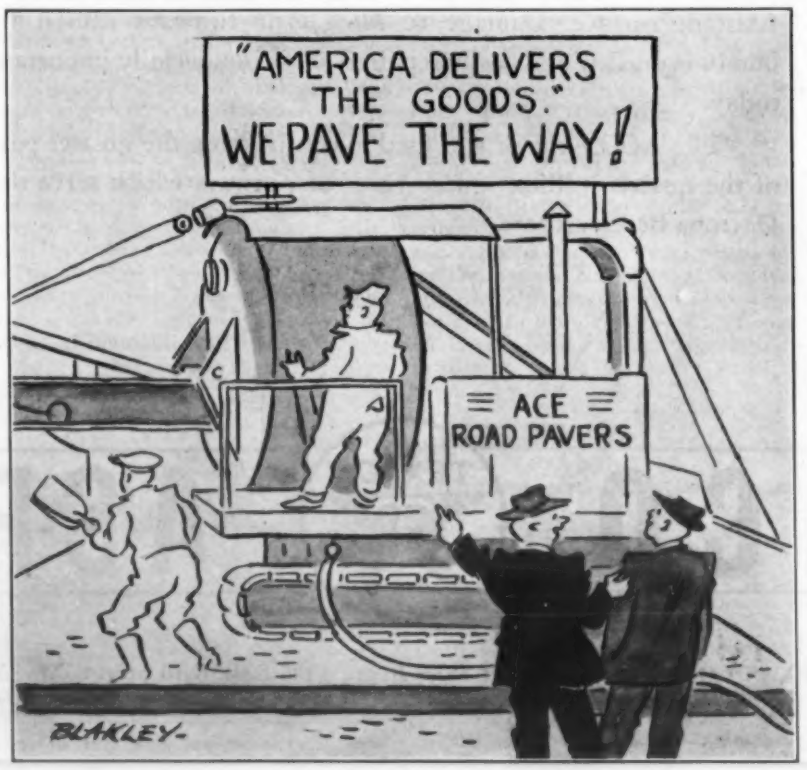
It is expected that this $30,000,000 will be sufficient to open the route throughout all the sections which are at present impassable in the wet season. Operations will, of course, depend upon the cooperative funds to be provided by each of the countries concerned, but it is anticipated that $5,000,000 will be expended during the first year of operations.

The Inter-American Highway, with the incompleted gaps that are now to be filled in, stretches 1,550 miles south and eastward on the Pacific Coast side of the rugged mountain ranges from the Mexico-Guatemala border to the Panama Canal. The northern section which crosses Mexico in a southeasterly direction from Laredo, Texas, is now open to all-weather travel to within 800 miles of the Guatemalan border.

The southern section passes through the capital cities of every Central American country except Honduras, where a road which connects the capital city of Tegucigalpa with the highway is already in service. The Highway also connects with the Trans-Isthmian road now being rushed to completion across the Isthmus of Panama, and will eventually be connected with the projected Pan-American Highway through South America.

To expedite work on the highway an Inter-American Regional Office has been established in the Public Roads Administration at Washington under the direction of Thomas H. MacDonald, Commissioner of Public Roads. E. W. James, formerly Chief of the Division of Highway Transport, and who for a number of years has been assigned to give technical advice and assistance in the development of the Inter-American Highway, heads the new office.

The future of highway construction and maintenance as affected by our all-out war effort, a subject of vital interest to our readers in the highway industry, will be discussed by leading state highway engineers in our March issue.



A.R.B.A. Convention

Since Road Builders share with the rest of the country the job of winning the war, the theme of the Annual Convention of the American Road Builders' Association to be held at the Hotel Peabody, Memphis, Tenn., March 2, 3 and 4 will be "Roads to Victory". Sessions on service, with Army, Navy and civilian authorities to answer questions about wartime fundamentals, will occupy the three days of this Defense Highway Congress.

Federal Aid Funds Apportioned for 1942

On December 31, 1941, the Federal Works Agency apportioned to the various states $100,000,000 for improvement of the Federal-Aid highway system, $17,500,000 for secondary roads, and $20,000,000 for the elimination of hazards at railroad crossings. These funds, which are for the fiscal year beginning July 1, 1942, were authorized by the Federal Highway Act of 1940 and are reduced by deductions authorized for administrative expense. It is required by law that the apportionment be made on or before January 1, 1942.

In making the apportionment, it was emphasized that it will be the policy of the Federal Works Agency to restrict the approval of projects to those essential to national defense as certified by the appropriate Federal defense agencies. Improvement of sections of highway which have been found to be inadequate for the greatly increased volume of defense traffic, strengthening or replacement of weak bridges on main highways, and improvements desired by defense officials in connection with planned operations will make up the program. All work will be done in cooperation with the state highway departments according to the usual Federal-Aid procedure, except that projects will be limited to those having a definite defense significance.

The apportionment by states follows:

State	Regular Federal Aid	Secondary or Feeder Roads	Grade Crossings
Alabama	$ 2,083,755	$ 364,657	$ 405,128
Arizona	1,435,456	251,205	129,583
Arkansas	1,709,471	299,157	336,460
California	3,989,896	698,232	798,434
Colorado	1,793,222	313,814	255,449
Connecticut	620,283	108,549	164,002
Delaware	487,500	85,313	97,500
Florida	1,431,426	250,499	299,694
Georgia	2,517,196	440,509	495,487
Idaho	1,238,004	216,651	165,774
Illinois	3,947,786	690,863	1,012,936
Indiana	2,409,852	421,724	503,499
Iowa	2,494,254	436,494	538,416
Kansas	2,524,344	441,760	485,674
Kentucky	1,853,318	324,331	358,327
Louisiana	1,479,614	258,932	317,974
Maine	866,360	151,613	133,885
Maryland	832,207	145,636	197,436
Massachusetts	1,310,162	229,278	388,101
Michigan	3,028,945	530,065	651,739
Minnesota	2,702,831	472,995	526,346
Mississippi	1,780,492	311,586	314,073
Missouri	2,963,919	518,686	578,946
Montana	2,020,796	353,639	262,388
Nebraska	1,991,271	348,472	333,931
Nevada	1,275,386	223,193	97,500
New Hampshire	487,500	85,313	97,500
New Jersey	1,273,680	222,894	376,647
New Mexico	1,622,549	283,946	177,246
New York	4,821,071	843,688	1,330,156
North Carolina	2,387,356	417,787	514,993
North Dakota	1,499,001	262,325	299,447
Ohio	3,520,305	616,053	818,984
Oklahoma	2,272,612	397,707	442,035
Oregon	1,649,132	288,598	228,533
Pennsylvania	4,087,815	715,368	1,089,534
Rhode Island	487,500	85,313	97,500
South Carolina	1,346,362	235,613	298,209
South Dakota	1,577,778	276,111	283,551
Tennessee	2,112,542	369,695	382,507
Texas	6,313,842	1,104,926	1,098,295
Utah	1,123,730	196,653	129,761
Vermont	487,500	85,313	97,500
Virginia	1,844,177	322,731	374,250
Washington	1,585,782	277,512	303,889
West Virginia	1,096,603	191,905	264,466
Wisconsin	2,400,972	420,170	483,930
Wyoming	1,245,987	218,048	131,879
District of Columbia	487,500	85,313	97,500
Hawaii	487,500	85,313	97,500
Puerto Rico	493,438	86,352	165,506
Total	$97,500,000	$17,062,500	$19,500,000

Hydraulic Power Control For Snow Plows, Graders

Hy-Rocket hydraulic control for snow plows, truck maintainers and road machinery is described in a new folder recently issued by the Monarch Road Machinery Co., 329 N. Front Ave., Grand Rapids, Mich. According to the manufacturer, the Hy-Rocket will give years of dependable performance. The fan-belt-driven pump is designed for quick easy installation on practically any make of truck and runs in a bath of lubricating oil, assuring smooth, quiet operation. Pressure of 1,000 pounds per square inch is delivered by the pump, controlled by one lever in the cab.

Copies of this illustrated folder may be obtained by writing direct to the manufacturer and mentioning this item.

Air-Control Shovel Catalog

The Osgood Type 70 air-control convertible shovel is described completely in a new bulletin, No. 4132, recently issued by the Osgood Co., Marion, Ohio. The machine is taken apart and all important construction features are illustrated with close-up photographs accompanied with informative descriptive text. Air-control, as used on the Type 70, eliminates many levers and odd working parts. According to the manufacturer, output is increased and lost motion, adjustment and replacement greatly reduced.

Copies of this new catalog may be obtained by writing direct to the Osgood Co. and mentioning this item.

Buda Appoints New Eastern District Sales Manager

Ralph R. Hayes has been appointed Eastern District Sales Manager for the Buda Co., Harvey, Ill., with headquarters at its New York Office, 253 West 64th Street, replacing Lew Crafts, who recently resigned. Mr. Hayes is well known to trade on the eastern seaboard.

ALL PAVING RECORDS SMASHED

SOUTH CAROLINA
Shaw Airport, Sumter, S. C.
Contractor: Wm. F. Bowe, Augusta, Ga.
217 ft. per hour—25 ft. width; 8-6-8 inch thickness.

CALIFORNIA
Hamilton Field, San Rafael, Cal.
Contractor: A. G. Raisch, San Francisco, Cal.
272 ft. per hour—25 ft. width — maximum single days pour 8-6-8 inch thickness.
190 ft. per hour—25 ft. width—Average for job.

NEW YORK
Rome Airport, Rome, N. Y.
Contractor: Turner Const. Co. —Louis Mayersohn.
167 ft. per hour—25 ft. width; 9-7-9 inch thickness.

MARYLAND
Edgewood Arsenal Airport.
Contractor: Cummins Construction Corporation, Baltimore, Md.
400 ft. per hour—12 ft. 6 in. wide; 9-6 inch thickness.

INDIANA
Jefferson Proving Ground, Madison, Ind.
Contractor: Simmons-O'Connor Co., Ft. Wayne, Ind.
239 ft. per hour—22 ft. width; 6 inch thickness. Average for job

WASHINGTON
Geiger Field, Spokane, Wash.
Contractor: J. H. Collins, Spokane, Wash.
250 ft. per hour—25 ft. width; 8-6-8 inch thickness.

BLAW-KNOX
. . . CONCRETE SPREADERS
. . . PAVEMENT FINISHERS

. . . this efficient slab-laying team serves the demands of airport construction for new speeds in paving production by breaking all known concreting records.

The authentic job data shown to the left tells the story.

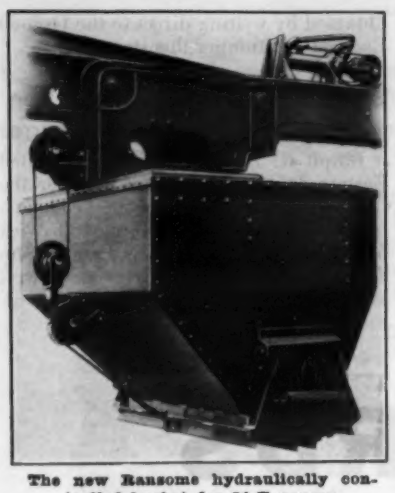
Spreading and finishing concrete slab at speeds to tax the maximum yardage output of the biggest paving mixers—scores of vital projects are being completed ahead of time (at Hamilton Field a 25 ft. width Blaw-Knox Spreader-Vibrator handles the output of three 27E pavers, all operating at full blast).

Contractors who have for many years looked to Blaw-Knox for the latest and best in paving equipment are now mechanizing their jobs with

BLAW-KNOX Transverse Blade CONCRETE SPREADERS
and
BLAW-KNOX Model XB Gas Driven FINISHING MACHINES
(Either machine equipped with vibrator if desired)

Blaw-Knox will be glad to send you complete details of these cost reducing, time saving machines.

BLAW-KNOX DIVISION of Blaw-Knox Co.,
PITTSBURGH, PA.



The new Ransome hydraulically controlled bucket for 34-E pavers.

Paver Bucket Has Hydraulic Control

In paving airport runways, access roads, tunnels, and similar work on which a concrete paver is used, it is often necessary to dump small portions of concrete here and there to complete each slab. Heretofore, it was necessary to load the paver bucket with the exact quantity required, making a special trip of the bucket to discharge the needed amount. This was due to the fact that once the bucket doors were opened they could not be closed by the operator without returning the bucket to the inner end of the boom. This kept batch trucks waiting for the drum to be emptied of its total batch.

The new hydraulically controlled paver boom bucket just announced by the Ransome Concrete Machinery Co., Dunellen, N. J., for its 34-E single and dual-drum pavers permits the bucket doors to be opened or closed to any degree at any position on the boom, allowing the entire drum batch to be discharged into the bucket, and then any amount of the load may be deposited in any place or places within boom reach.

All inside and outside levers, arms, etc., have been eliminated and the boom bucket carriage has no operating parts requiring adjustment or repairs. The elimination of these parts also reduces the dead weight of the bucket and helps to minimize the strain on the boom when the bucket is in spreading motion, the manufacturer states. The fact that no stop is necessary in order to close the bucket doors makes it possible to deposit concrete from the bucket even when it is in its innermost position, as well as eliminating the noise of the bucket hitting the door-closing stop.

The bucket doors slide open instead of dropping, which provides a clearance of 23 inches from the ground with the doors open and 21 inches when closed. This is adequate to clear strike-off devices or other obstructions.

Bulletin No. 195, fully describing and illustrating this new paver bucket, may be secured direct from the manufacturer by mentioning this item.

A White Guide to Safety

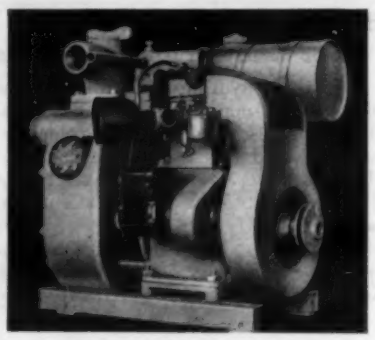
This is the title of a new 30-page booklet on white concrete reflecting curb, issued by the Universal Atlas Cement Co., and based primarily on New Jersey highway practice in the specifications and construction of this type of reflecting curb.

The foreword to this booklet points out that safe driving depends primarily on visibility. For normal night driving the only effective source of light is the driver's headlamps, and his guide to safety is the road's edge. The curb defines the road's edge effectively only when it is highly visible and at night it is visible only when it reflects light and then only when it reflects that light in the proper direction; namely, back to the driver. This book describes curb that is highly visible at night because it meets the two requirements of visibility: 1, a curb that is a good reflector of light, and 2, a curb that is scientifically designed to reflect that light in the proper direction, back to the driver.

Copies of this booklet, which contains a large number of photographs and diagrams showing the design of these curbs, the two types of white concrete reflecting curb, and specifications for this curb, may be secured direct from the Universal Atlas Cement Co., 135 East 42nd St., New York City, by mentioning this item.

Markley Opens New Plant

Markley Dust Control System, Inc., announced recently the opening of its new plant at 431 Fayette Ave., Mamaroneck, New York. This new plant is larger, has new facilities, a larger personnel and will operate day and night to fill defense orders.



2" High-Pressure Pump

Light weight, high-capacity, self-priming

Delivers 65 gallons per minute against 50 lbs. pressure, or 50 gallons per minute against 65 lbs. pressure. Suitable for jetting piles, supplying water to concrete mixers through long pipe lines against high pressure.

Ask for bulletin describing high-pressure pumps.

Made by

MARLOW PUMPS

Ridgewood New Jersey

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★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

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15-Ton Triple-Geared "Special" .....1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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Youghiogheny Tunnel Driving, Concreting

Outlet Works for New Dam Being Constructed South of Confluence, Pa., Completed by Herman Holmes, of Michigan

✦ SINCE 18-foot tunnels seem to be the mode in recent construction, Herman Holmes acquired the jumbo and forms from the 18-foot Green Mountain diversion tunnel in Colorado, used them in driving and concreting the 18-foot outlet tunnel for Youghiogheny Dam, 2 miles south of Confluence, Pa., and then sold them to another contractor for an 18-foot tunnel in Michigan. Holmes operated a very smooth job at "Yock," the understandable popular abbreviation for Youghiogheny, completing the driving and concreting of the 1,750-foot tunnel and shaft in very fast time. This contract was a part of the U.S.E.D. project to control the flood waters of the Youghiogheny River in order to protect the southwestern section of Pennsylvania from floods—a project of even greater importance now because of the many industries important to national defense located in the area.

Driving the Tunnel

In driving the tunnel the contractor ran a full face except for the 3 feet in the bottom of the invert. Eight-foot rounds were drilled with six Ingersoll-Rand water Leyners mounted on a standard jumbo which was completely removed from the tunnel during blasting and mucking. The holes were fired with 40 per cent Hercules and du Pont dynamite fired off a special firing line carried on the opposite side of the tunnel from the lighting line. For ventilation, a Buffalo 24,000-cfm blower and a 24-inch spiral metal pipe were used. There was very little dust in the operation but the muck pile was sprayed before loading by a Sullivan scraper mucker operated by a 440-volt electric motor. The 6-yard Koppel industrial railway dump cars for mucking were pulled by two Goodman 5-ton electric locomotives. The haul from the most distant face to the dump was about 2,000 feet.

The drilling crew consisted of six drillers, six helpers, one nipper, one muck-machine operator and two motor men. The drillers took care of scaling and cleaning the face while the helpers moved the muck cars for the Sullivan mucker. The overbreakage on this job established some kind of a record, for when concreting took place only 1 per cent additional concrete was needed to take care of overbreakage. The drilling was through shale although the roof rock ran to sandstone in the center of the tunnel and that material broke remarkably clean.

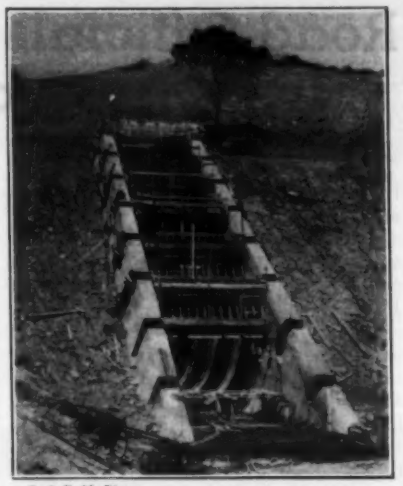
The steel ribs for the 18-foot diameter tunnel are rolled 8-inch H-beams spaced 18 inches on centers near the outlet end of the tunnel, because of poor rock, and on 3-foot centers throughout most of the tunnel. At the outlet end the ribs were back-packed with gravel to insure adequate support for the roof rock. The ribs were all tied with 1½-inch spacer rods, 12 to a section. The ribs were carried against the face of the tunnel at all times.

The Tunnel Forms

The Blaw-Knox steel tunnel forms were made in 5-foot sections and assembled 10 forms for a pour. Two separate jumbos were used to support the forms and these could be pulled ahead one or both at a time. For setting the forms, 4 ratchet jacks were used on each jumbo in combination with a turnbuckle with each jack as illustrated. After the rails on which the jumbos ran had been set and the turnbuckles once set to the proper length, all adjustments in setting and collapsing the forms were done with the quick-acting ratchet jacks. The face of the steel forms was ¼-inch sheet metal with 4-inch channel studs running horizontally between the end plate stiffeners 5 feet apart, making one unit of form. The inspection doors alternated in the forms with one at the center height of the form for one section and on the adjacent sections one near the bottom and one at the crown.

Concrete Mixing and Placing

Aggregate for the concrete was stockpiled at either end of the tunnel and then two complete batching plants set up. A Northwest crane and clamshell bucket was used to handle the 2-inch aggregate to the Heltzel Agrabatcher which was equipped with Kron dial scales, and the smaller gravel and sand to the Erie AggreMeter plant. The batchers were discharged into 2-batch trucks and hauled to the skip of a Rex 27-E paver mounted on cribbing of 12 x 12 timber. The paver had the boom removed and a chute replacing it to deliver the mixed batches to the agitator hopper of the No. 200 Pumpcrete. The first set-up was at the inlet end and the second at the outlet end of the tunnel,



C. & E. M. Photo
Inlet end of Youghiogheny Tunnel, showing the forms for the trash racks.

with a third set-up back from the tunnel portal to permit the easy removal of the

(*Continued on page 38*)

The Original BucketruX

Trade DEMPSTER DUMPSTER Mark

Reg. No. 353486

Mfgd. by

DEMPSTER BROTHERS, Inc.

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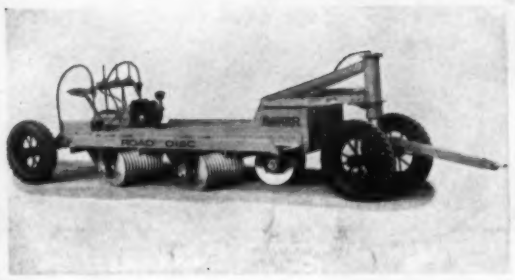
These Stabilized Soil Road Making Tools Speed Bituminous Road Maintenance, Too!

Buy two-timers, these Baker Road Building and Maintenance Tools



Baker Road Discs have hydraulic control—ride the discs high on dry or wet mixing for soil stabilization and on "black top" maintenance or dig them in, up to a half a foot to pulverize rooted roadbeds. Or cut deep on the crown side and shallow on the berm side—they're as flexible as a piece of chain.

Not a made-over farm implement—they're tough, heavy duty road machines. Alloy steel disc gangs adjustable to crown of road—discs can be spaced for 2", 4" or 6" centers. Roller bearings throughout. *They cut ice and packed snow, too, in the winter time.*

Baker Road Maintainers spread cement, calcium chloride or other binder in soil stabilization, level the mixed material to ready it for compacting, and they blade disked materials on bituminous roads preparatory to compacting. Do all jobs quickly and thoroughly. Hydraulic controlled blades, adjustable to conform to crown of road or ditches. Enables you to get more use from your tractor.

Get the complete facts on these cost-cutting, job simplifying, dual purpose Baker Road Machines, Discs, Maintainers, Rooters—send for Bulletin No. 834-M.

Baker Road Rooters were specifically designed for road work. Hand wheel adjustment. Digging controlled from tractor driver's seat. The rugged standards take hard top and old impacted road-beds in their stride. Wear resistant, replaceable teeth penetrate to a foot deep. They speed stabilized soil road construction and break up "bulges" and "flows" on "black top" roads.

Baker Disc Grader Attachments are readily mounted on the moldboard of patrol graders—swing out of the way when not in use. Depth of cut and work angle controlled by same mechanism that operates blade. Doubles the utility of any blade grader. Makes fine surface cuts on "black top" and oiled roads to take down corrugations and bulges. Speeds shoulder maintenance. Send for Bulletin No. 831.

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BAKER *The Modern Tractor Equipment Line for* EARTH MOVING LEVELING AND GRADE BUILDING SNOW REMOVAL ROAD MAINTENANCE

Road Officials Discuss Highway Work in Wartime

(*Continued from page* 1)

transporting munitions, goods, people and food.

What are these three strategic networks? First, the strategic network carefully selected by Army, Navy and Public Roads Administration officials; second, the industrial highways and access roads serving the great assembly of industrial plants, large and small, scattered throughout the country; and, third, the human needs network. This last is given least consideration by military strategists, but already Washington is calling for greater planting of food and other crops which must be hauled in good weather or bad over our secondary and tertiary roads to reach the markets where they will be gathered together for lend-lease shipments to England, Russia and China. These same roads similarly serve the great factories which are converting the products of the soil into the munitions of war through the wizardry of chemistry, and carry thousands of defense workers, in many cases considerable distances, from their homes to the new centers of war industry which are springing up throughout the land.

In this issue of CONTRACTORS AND ENGINEERS MONTHLY, preceding the Annual Convention of the American Road Builders' Association, we give you the best thought in the country on the relation of our highway construction and maintenance to the world situation today. Our guest editorials on page 4 present the points of view of General Philip B. Fleming, Administrator, Federal Works Agency, and of Charles M. Upham, Engineer-Director of the American Road Builders' Association, and in the paragraphs below are statements by leading highway engineers and officials of highway groups on the effects of war on the highway industry. Our next issue will carry a further discussion of this problem by state highway engineers representing all parts of the country.

Highway Construction Restricted

By THOS. H. MacDONALD, Commissioner, Public Roads Administration

Conversion of the productive facilities of the United States to war effort is certain to produce major changes in our highway program. The 1,300,000 miles of surfaced roads are playing a most important part in the processing of raw materials into implements of war. Those highway improvements essential to the training of men, to war industries and to main streams of defense traffic will be made. Other highway work will be possible only to the extent that it does not interfere with preparations for war.

Highway work is already handicapped by shortages. Preference ratings will be issued for necessary materials and equipment on the basis of recommendations of state highway departments and the Public Roads Administration. War needs will be the only guide in making these recommendations. There will be shortages of steel and similar critical materials, of skilled labor and other workers, of transportation capacity, of contractors, and of road-building equipment.

Equipment shortages will develop as manufacturers switch more and more to the production of war materials and as thousands of road-building machines are shifted to the theatres of military operations. In this war of motorized and mechanized armies supported by air fleets, road machinery is indispensable in organizing and conducting vast offensives. It is absolutely necessary for the rapid construction and maintenance of innumerable air bases and adequate lines of supply.

Ordinary highway construction will be further restricted by a curtailment of normal Federal expenditures, by lowered yields from registration and gasoline taxes, and very likely by reduced county and city property taxes. The counties and cities will surely have to cut expenditures and lighten their load on the taxpayer if he is to carry the burden of higher war taxes.

Federal highway funds and matching state contributions will be rigidly limited to the construction of roads certified by military and naval authorities as important and necessary in the war effort. Projects of this type will first of all be those needed to provide adequate access to Army and Navy establishments, industrial plants engaged in war production, and strategically important raw materials. Special Federal funds have been authorized and appropriated for this access-road construction.

Other work of certified necessity will include the conditioning of some sections of the strategic network of highways of military importance and some sections of main state and city arteries that carry heavy war-production traffic. This construction will be financed by regular Federal Aid and state and local funds. The Federal funds will be applied only to the correction of the most critical deficiencies of the more important routes, especially to the strengthening of bridges.

(*Continued on page* 34)

THE MOST IMPORTANT UNIT FOR AIRPORT RUNWAY CONSTRUCTION

Whenever there is mixed-in-place construction such as soil-cement, bituminous, etc.

It does the job Thoroughly, Rapidly, and Economically.

It operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of Aggmixer tines does a thorough job of mixing—wet or dry. Send for job facts now.

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Supplementing a factory Parts Depot at Lorain, O., operating on a 7-day a week, 24-hour a day basis, each distributor listed below carries a representative and close-by stock of spare parts for all Thew-Lorain shovels and cranes. Call him day or night. He will do his part to help you "keep 'em digging."

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3/8 TO 2 1/2 YDS.

"Slow and Easy" Should Be Motto for Tire Use

If you want your tires to give you extra miles of service, take it easy on the curves. This is the warning to American motorists issued recently by P. W. Litchfield, Chairman of the Board, Goodyear Tire & Rubber Co., Akron, Ohio.

On one of the main highways between Akron and Cleveland, a distance of 35 miles, there are eighty curves. Sweepings from these curves have been collected, analyzed and compared with sweepings taken from straight stretches on the same highway. This test revealed that tire wear on curves is 1,200 per cent greater than on the straightaway.

The most important factors in tire life, it is pointed out, are speed, overloading, under-inflation, wheel alignment, brake equalization, "jack rabbit" starts and abrupt braking. When speeds are reduced, the rate of tire wear declines abruptly. Goodyear research men have estimated that the average tire on a new car will give 30,000 miles of service if it is driven at an average speed of 35 miles an hour, whereas if the average speed is 50 miles an hour, the tire will wear out at 20,100 miles.

There are 110,000,000 tires and tubes on the streets and highways of America today. If each driver would reduce his average speed by 10 miles an hour, he would get about 6,300 extra miles out of his tires. This would amount to a total of almost 7,000,000,000 extra tire-miles for the nation as a whole.

Promotions at Wickwire

Wickwire Spencer Steel Co., 500 Fifth Ave., New York City, announced the election of Dean Rollans as Vice President in charge of sales, and the appointment of William H. Husted as Assistant to the President. In addition, three days a week Mr. Husted will serve as consultant to the Raw Materials Division, Iron and Steel Unit of O. P. M.

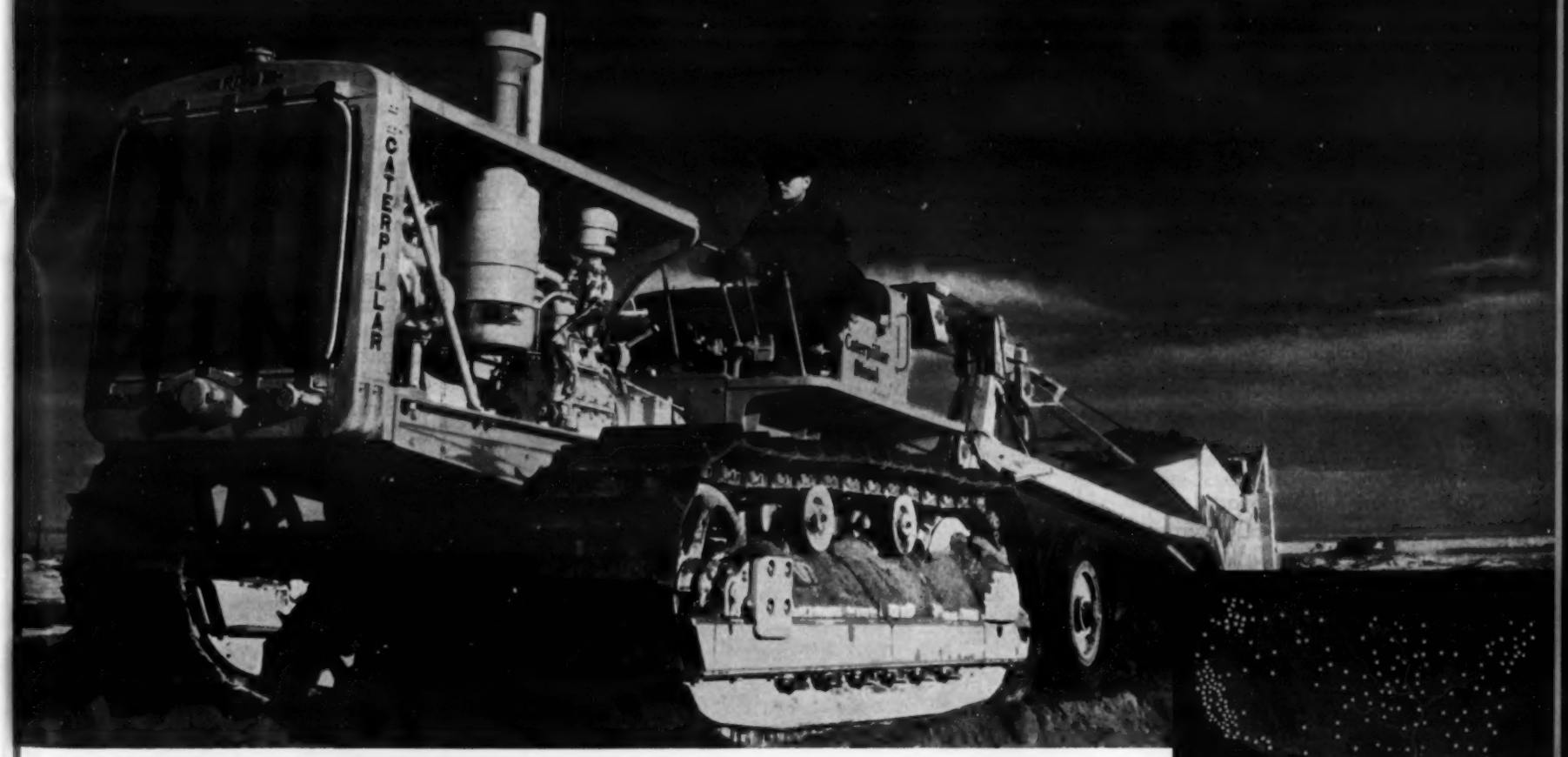
Mr. Rollans joined Wickwire Spencer in 1928 as district credit manager and wire rope sales representative in Tulsa and at the time of his promotion was General Sales Manager at the company's headquarters in New York.

Mr. Husted was formerly associated with the United States Aeromotive Corp. and joined Wickwire Spencer in 1941.

New Griffin Quarters

The Griffin Wellpoint Corp., New York City, manufacturer of wellpoint systems, pumps and generators, moved to new and larger quarters at 881 East 141st Street the first of the year.

GOOD BASES
KEEP 'EM FIGHTING!



SHIPS, tanks, planes . . . only with the support of well-equipped naval, military and air bases can these vital arms of war make full use of their might.

The efficiency of construction equipment — whether defense, public or private — is governed by the same need . . . BASES. Stamina and big work-capacity are built into "Caterpillar" Diesel Tractors. But to enable them to "take it on the chin and keep on coming," replacement-parts and mechanical-service facilities are essential.

"Caterpillar" dealers provide just such "advance bases." All have heavy investments in parts, repair equipment and servicemen pay-rolls. They help to keep idle time down and work hours up for the contractor . . . help to keep the far-flung fleets of "Caterpillar" Diesels "fighting"!

CATERPILLAR TRACTOR CO., PEORIA, ILL.

EACH DOT A "CATERPILLAR" BASE—
"Caterpillar" parts-and-service facilities are the most complete and readily available of their kind in the world. No contractor in the United States is more than a few hours (and often it's only a few minutes) from stocks of genuine parts and factory-trained servicemen.

★ ★ ★

FOR VICTORY—Our armed forces have first call on "Caterpillar" production. We thank customers who have suffered delivery delays by giving clear right-of-way to our Victory efforts.

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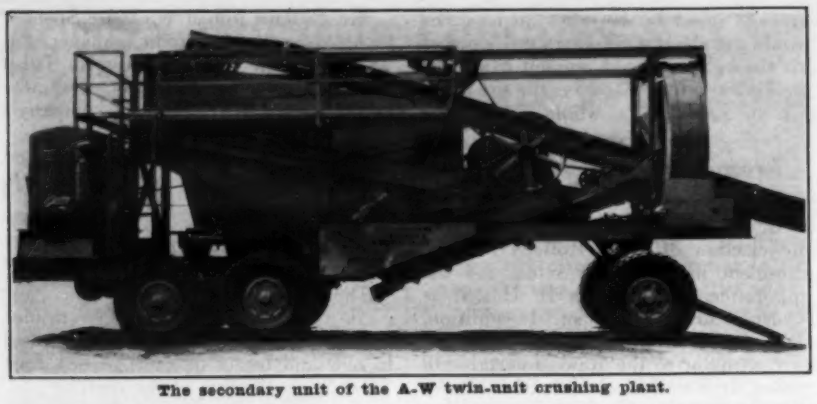
REG. U.S. PAT. OFF.
TRACK-TYPE AND WHEEL TRACTORS • ROAD MACHINERY • ENGINES AND ELECTRIC SETS



The secondary unit of the A-W twin-unit crushing plant.

Twin-Unit Crushing Plant Highly Portable

An entirely portable double-unit crushing plant capable of delivering large outputs of crushed gravel or stone has recently been announced by the Austin-Western Road Machinery Co., Aurora, Ill.

The reduction unit is suited equally well for gravel or for quarry service and consists of a 4022 all-roller-bearing roll crusher, a 4 x 12-foot triple-deck gyrating screen and a rotary return elevator, all mounted on a 6-wheel pneumatic-tired truck equipped with 30-inch feed and delivery conveyors. The primary unit, which is used ahead of the secondary unit for gravel service, normally consists of a 1036 jaw crusher with a scalping screen mounted on a truck with a feed conveyor; for quarry service a large-opening jaw crusher with an apron-type feeder is used.

The manufacturer states that by carefully designing all composite parts and members, it has held the weight of the secondary plant to 39,000 pounds, with an overall width of 8 feet and an overall height, when operating, of 13 feet. The height can be reduced to 12 feet to provide additional transporting clearance. Similarly, the weight of the primary unit for gravel service is but 23,000 pounds with an overall width of 8 feet and a height of 11 feet. The design also provides ready accessibility for all parts.

Further information on these two units and the flexibility they provide for meeting various material specifications from local deposits may be secured by interested contractors and state and county highway departments direct from the manufacturer.

Catalog on Road Broom For Sweeping Highways

A new specification sheet devoted to the Cedarapids traction broom has recently been issued by the Iowa Manufacturing Co., Cedar Rapids, Iowa. This unit, according to the manufacturer, is easily towed by a truck or tractor and has a correct speed for every condition of sweeping, dusting or spreading. Power is provided by the rear wheels through transmission gears to a universal joint shaft and sprockets and chains. The transmission gives three broom speeds for any traveling speed and it will sweep uniformly over the road surface regardless of speed variations. The position of the broom can be quickly and easily reversed so that it can be used to sweep either to the right or left, and controls are located conveniently for operation from a platform at the rear of the chassis.

This new bulletin shows three views of the broom and describes in detail its operation and special features. Ratios of travel and broom speed are given and complete specifications are listed. Copies of this bulletin, TB-1, may be secured direct from the manufacturer by mentioning this item.

Hard-Facing Metals Help Cut Road Costs

In order to clarify and bring up-to-date the methods of repairing and hard-facing machinery used in building and maintaining roads, the Stoody Co., Whittier, Calif., has recently issued a new booklet entitled "Five Ways to Cut Road Making Costs". The problem of the severe wear to which road machinery is subjected has always been important from the point of view of operating costs. This problem has become even more urgent now because of the fact that, for the duration of the war, new equipment will be increasingly difficult if not impossible to secure. For this reason, it is imperative that contractors and state and county highway departments make their present equipment last as long as possible.

One way of increasing the life of equipment is by hard-facing those parts such as grader blades, scarifier teeth, tractor grousers, track rollers and shoe rails which are subjected to severe wear. For this purpose the Stoody Co. produces four hard metals particularly designed for use on road equipment. These metals, Tube Borium, Borod, Stoodite and Stoody Self-Hardening, are available for electric and acetylene application.

This new Stoody booklet is devoted to a discussion of hard-facing, recommendations for various types of problems, and gives the hard-facing procedures for the types of equipment mentioned above. It is designed to supplement the Stoody Catalog No. 106, which contains full details on the various types of Stoody hard-facing metals, and is primarily a manual for their use. Copies of this manual, as well as Catalog No. 106, may be secured by those interested direct from the manufacturer by mentioning this item.

Buy Defense Bonds and Stamps.

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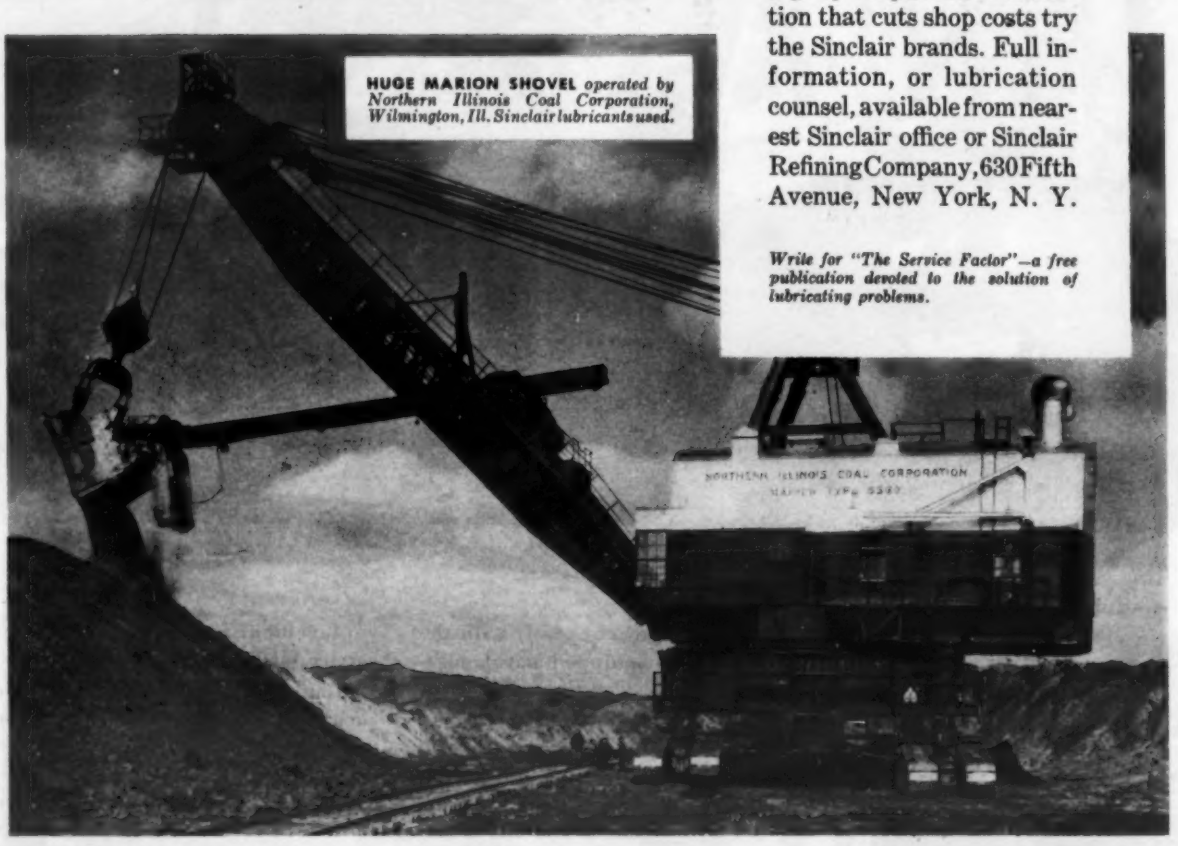
Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



HUGE MARION SHOVEL *operated by Northern Illinois Coal Corporation, Wilmington, Ill. Sinclair lubricants used.*

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Boulevard Highways Serve Mississippi

Construction Along Coast And New Project on U.S. 49 Improves Major Routes on Strategic Network

(*Photo on page* 56)

✦ MISSISSIPPI has taken the second great step in the highway program which was initiated by its bond issue in 1936 and started the replacement of gravel roads with high-grade asphalt and concrete highways. Now this has been carried a step further with the rebuilding of sections of U.S. 90, the Gulf Coast highway and part of the strategic network, with two 25-foot roadways built adjacent to the new sea wall, partly on fill pumped in from the Gulf at the time the sea wall was constructed. Sections of this great boulevard highway have been completed at Biloxi, Gulfport and Pass Christian, with wide variable-width neutral strips; and additional sections are to be constructed just as soon as right-of-way difficulties have been cleared up.

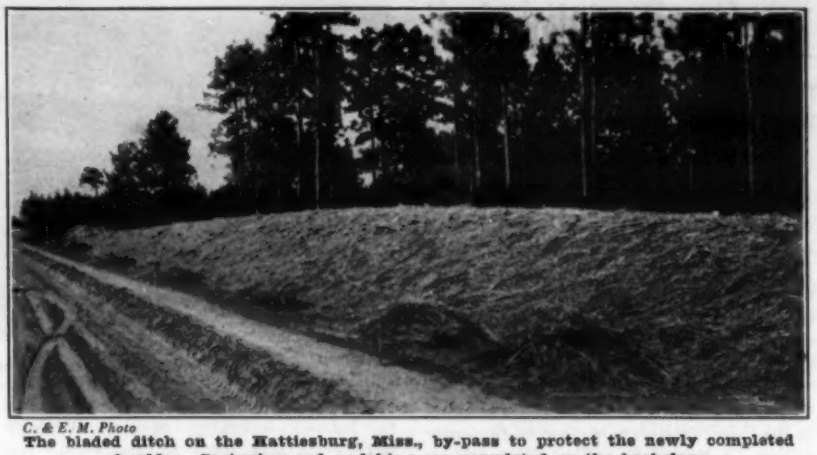
Hattiesburg By-Pass

U.S. 49 north from Camp Shelby, the 55,000-man tent camp for training infantry and field artillery units, to north of Hattiesburg, by-passing the city, has been improved as two separate projects, the first section by WPA and the second by contract. The old highway is a 20-foot concrete pavement of 7-5-7-inch section, with minimum sight distances of 500 feet. The new 22-foot concrete highway to the east of the old road has a section of 9-6-9 inches and sight distances of 1,000 feet, and separated by a 104-foot neutral strip which is being attractively landscaped. The two roadways serve as an interesting example of the elimination of rapid changes in grade by the new requirement of at least a 1,000-foot sight distance. All cross roads are brought into the new roadways at satisfactory grades and at proper locations where the sight distances are adequate for the protection of entering vehicles and high-speed through traffic.

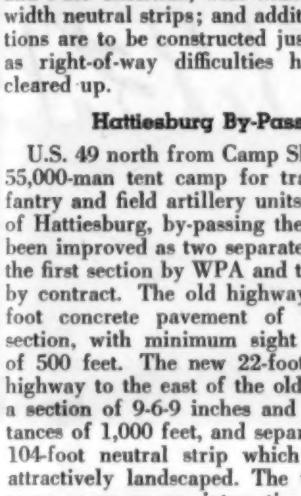
The WPA section, 6 miles long, was designed and supervised by the State Highway Department. It runs from the south, or truck and bus, entrance to Camp Shelby to the beginning of the new four-lane by-pass at Hattiesburg, which is being constructed by contract. At present, the two roadways converge at the north end to join with the by-pass section, where the roadways are separated by an 18-foot neutral ground on a 150-foot right-of-way. Throughout the new work, the shoulder and foreslope is on an 8 to 1 slope with a 2-foot flat-bottom ditch, and the backslopes are a maximum of 2 to 1. All slopes have been covered with 4 inches of top soil over the existing clay, and planted with 1-inch-diameter sprigs of grass. As soon as these have taken hold and started to grow, they are completely covered with 1 inch of hay to protect the roots and permit natural development.

An interesting feature of the protection of the shoulders and foreslopes by the grading contractor who did this work was the blading of a drainage ditch in the grade 3 feet from the edge of the shoulder and 6 inches deep. This ditch is continuous, so as to confine the water and protect the shoulder sprigs from washing until they had an opportunity to get started. If heavy rains fill the ditch and cause the material piled up by the blade on the shoulder side to break through, the breaks are very few, thus minimizing the number of repairs to the shoulders.

At the junction of U.S. 49, which runs from Gulfport, Miss., north to Hattiesburg and to Jackson, with U.S. 11, which starts at the Louisiana-Mississippi line west of Bay St. Louis, Miss., and continues to Hattiesburg and to Meridian, Miss., the State Highway Department has built a well-conceived clover-leaf and overpass occupying 64.5 acres of right-of-way. The overpass structure is of concrete with a 52-foot span, and carries U.S. 49 by-pass over U.S. 11, which at present runs directly through the business center of Hattiesburg. Both of these routes are also on the strategic network.



C. & E. M. Photo
The bladed ditch on the Hattiesburg, Miss., by-pass to protect the newly completed shoulder. Sprigging and mulching are completed on the backslope.



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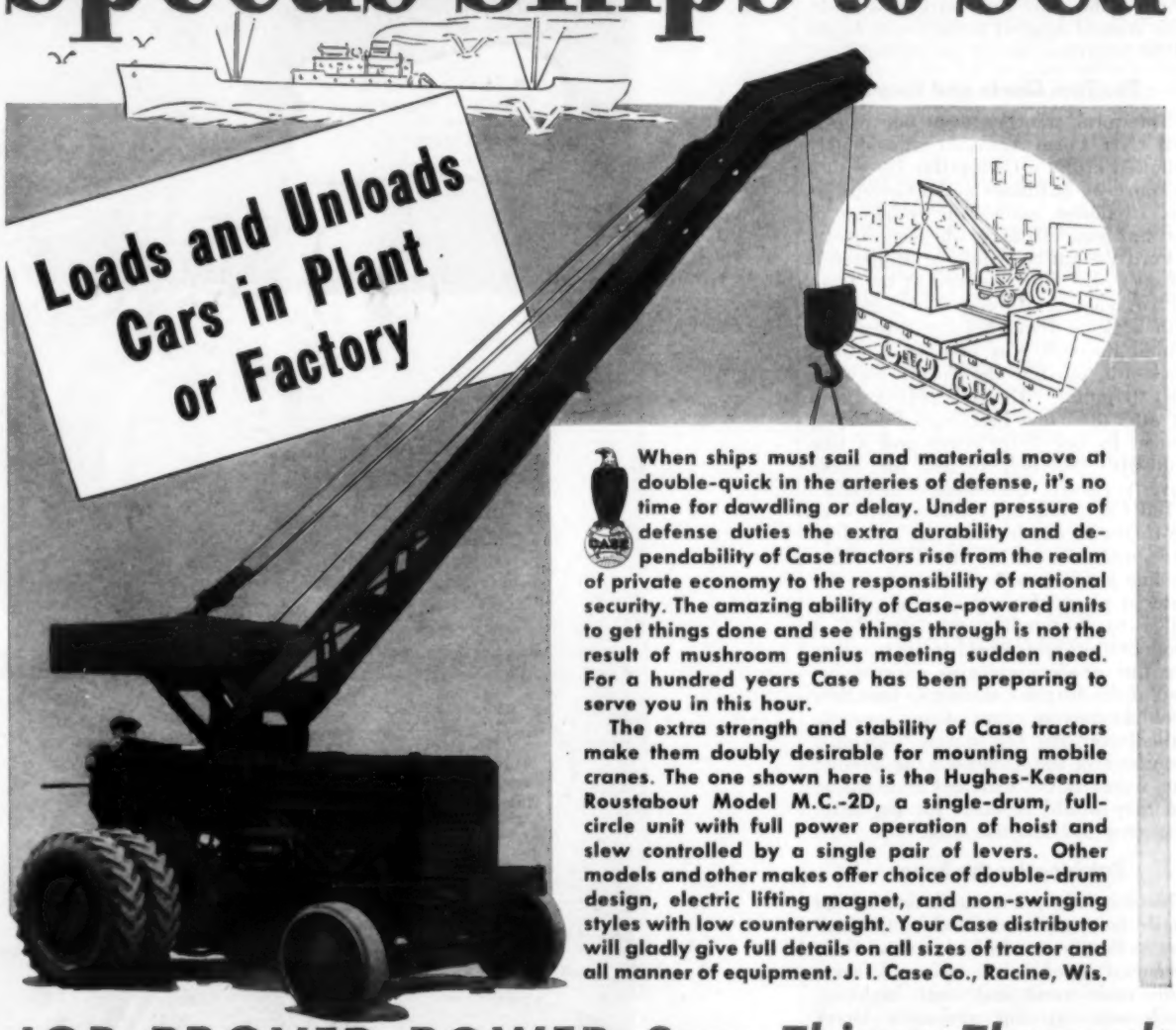

When ships must sail and materials move at double-quick in the arteries of defense, it's no time for dawdling or delay. Under pressure of defense duties the extra durability and dependability of Case tractors rise from the realm of private economy to the responsibility of national security. The amazing ability of Case-powered units to get things done and see things through is not the result of mushroom genius meeting sudden need. For a hundred years Case has been preparing to serve you in this hour.

The extra strength and stability of Case tractors make them doubly desirable for mounting mobile cranes. The one shown here is the Hughes-Keenan Roustabout Model M.C.-2D, a single-drum, full-circle unit with full power operation of hoist and slew controlled by a single pair of levers. Other models and other makes offer choice of double-drum design, electric lifting magnet, and non-swinging styles with low counterweight. Your Case distributor will gladly give full details on all sizes of tractor and all manner of equipment. J. I. Case Co., Racine, Wis.

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Mobility plus unlimited crowding range adapts Case-powered loaders to scattered jobs and scattered materials. There are also mowers, sweepers, maintainers, and many styles and sizes of snow plows.

★

CASE

Batching and Forms For New Access Road

(*Continued from page 2*)

low loess requiring 57,910 cubic yards of excavation and 23,364 square yards of concrete pavement. The contract was awarded to Peter Kiewit Sons' Co. of Omaha, Nebraska, and the Western Contracting Corp. of Sioux City, Iowa, which did the grading and paving respectively.

The pavement has a 9-7-9-inch cross section with the thickened edge reducing to the 7-inch uniform section in the outer 3 feet of the slab. The pavement is crowned 1 and 13/16 inches in 22 feet.

Preparation of Subgrade

A Method B compaction treatment was specified for the subgrade during compaction with sheepsfoot rollers on this job. Under this classification the moisture must be maintained within 4 per cent above or below 90 per cent of the optimum moisture content for the soil. The dirt went in on this job in the upper limit of Class B and most of the tests showed that it went in at optimum moisture content because rains had furnished the required moisture which ordinarily would not exist in the soil at the time of the year this work was done. This control applied to the top 6 inches of the subgrade during compaction.

The Fine Grade and Forms

The form trenches were cut with a Ted Carr Form Trencher immediately followed up by a Caterpillar D6 with a LeTourneau bulldozer and a Caterpillar No. 12 power grader for roughing in and finishing off the grade respectively. A Ford V-8 flat-bed truck, equipped with a heavy pipe frame welded at the front for carrying reinforcing and pipe and with a Beebe hand hoist mounted just behind the cab, was used as a utility truck for moving the forms forward after stripping. The Heltzel forms were set, after three men had cleaned the form trench, by one form setter and a line man with two helpers and one stake driver per shift. Immediately thereafter a Ted Carr subgrader was pulled over the forms by any handy piece of equipment, such as a tractor or roller. After the fine grade crew had cleaned out the material planed from the surface, it was rolled to thorough compaction by a 5-ton Buffalo-Springfield tandem roller. The fine grade crew also covered the base of the forms with dirt so that they would be easy to clean of any concrete spilled over the top during finishing. Then back of the finishing gang another man removed the dirt and concrete so that they would be clear for the stripping gang the next morning.

Batching for the Paver

The batching plant was located about 1 mile from the north end of the contract so that the trucks had to drive fully three-quarters of their haul over a heavy-traffic main north and south highway, which was carrying unusually heavy traffic due to construction at the aircraft plant. This heavy traffic was naturally the cause of a considerable number of accidents, so that the speed on the highway was reduced to 40 miles and some half dozen State Highway Patrolmen rode up and down the west section continuously. While they were on the road there seemed to be a minimum of difficulty, based on our observation of seven round trips on the highway in two days.

The batching plant was located on a spur track so that the Koehring 604 crane operated at about mid-height of the cars on a bank of gravel and the operator could have a clear view of all of his operations. He unloaded the gondola cars with a Blaw-Knox Dreadnaught clamshell bucket to the wood bins over the Johnson weighing batchers. A heavy wire rope was used by the crane for moving the string of cars ahead, and this operation was quite frequent because of the single size of aggregate used. The excessive use of rags and burlap bags for stuffing cracks in the cars made necessary the use of a screen over the top of the hoppers. Some of the reinforcing fabric from the road job was used for this purpose.

C. & E. M. Photo
The Jaeger finishing machine working a heavy load of dry concrete.

The batch, including the moisture content in the aggregate, consisted of 4,127 pounds of sand-gravel and 911.33 pounds of cement, yielding 1.385 cubic yards per batch. The batch, expressed another way, consisted of 415 pounds of dry aggregate per sack of cement, and seven sacks of cement were used per cubic yard for the 34-E paver.

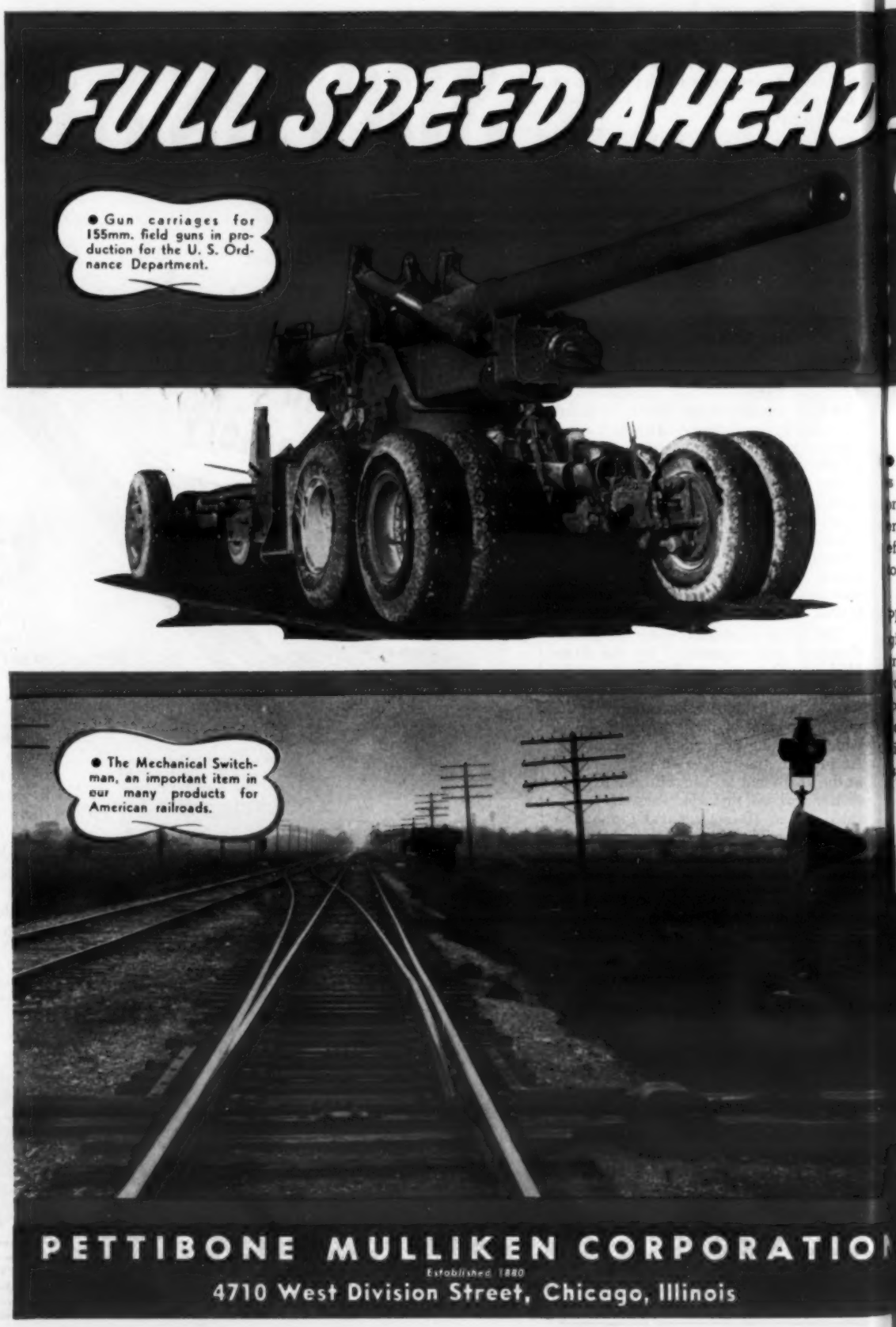
After receiving their two batches of aggregate the trucks drove about 250 feet to the Johnson Dutch Mill cement batching plant set up alongside two box cars of bulk cement. The handling of the cement from the cars to the hopper feeding the bucket elevator of the batching plant was not very smooth. One car was spotted so that men with two-wheel cement scoops could deliver direct into the hopper. In order to maintain the speed of delivery required, the platform was extended to a second cement car where two men shoveled the cement into cement carts, wheeled it over to the side of the hopper and dumped it.

On this job the contractor ran ten 2-batch trucks which were covered with tarpaulin during hauling. They ran between the forms on the fine grade, were turned on a Blaw-Knox turntable, and backed to the paver skip.

The Joints and Steel

Expansion joints of 1-inch preformed

(*Continued on page 42*)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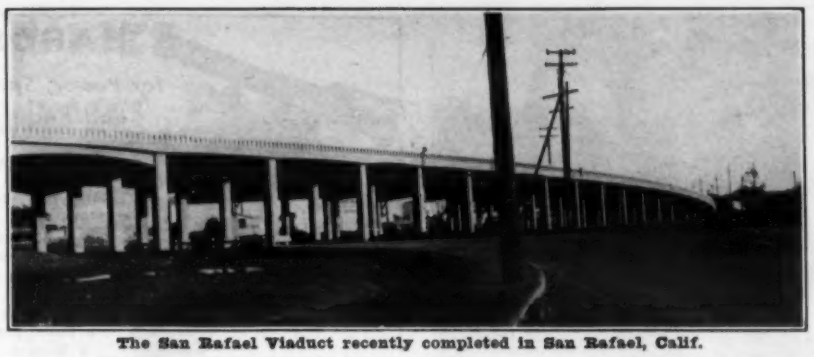
A Correction

In our December, 1941, issue, there appeared an article on the construction of the San Rafael Viaduct in San Rafael, Calif. This 2,207-foot concrete structure, recently completed for the California Division of Highways, carries a state highway over the community of San Rafael.

Unfortunately the photographs furnished us to illustrate this article were not of the San Rafael Viaduct, but of another structure altogether. We therefore are publishing with this item a photograph of the San Rafael Viaduct and apologize for the error.



The San Rafael Viaduct recently completed in San Rafael, Calif.

New Sealing Material For Concrete and Steel

Weld-On sealer is a new sealing material to protect concrete and steel surfaces above or below ground level, such as foundations, bridge piers and abutments, concrete and steel conduits, and similar structures, from water, weather, rust and corrosion. It seals porous and weather-worn walls and foundations and waterproofs concrete walls and floors.

The producer states that Weld-On finishes to a smooth surface, forming an inseparable bond with steel or concrete. It is easily used, being mixed with cold water to a heavy paste consistency and applied with an ordinary paint brush. It is reported that it is flexible under water and will not be dislodged by expansion and contraction due to changes in temperature. It can be applied directly over damp surfaces.

A folder containing further information on Weld-On, as well as a free working sample of Weld-On and directions for its use, may be secured by interested contractors and engineers direct from the producer, the Paint-Point Corp., 275 Passaic St., Newark, N.J., by mentioning this magazine.

...r-for greater production

Twice as many PMCO Welded Dippers produced in 1941 than the year before

41% increase in railway track equipment production in 1941 over previous year

Up to schedule in the production of war materials

Pettibone Mulliken production ... in high gear for still greater production in 1942. Our customers can count on our very best efforts to fill orders in the months to come.

Whether it is the building of PMCO Welded Dippers for digging vitally needed iron ore—track equipment for necessary railroad maintenance—or gun carriages for arming our fighting forces in the field, Pettibone Mulliken is tackling the job with full speed ahead for 1942.

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We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago, Illinois

Varied Units Handle Access-Road Grading

(*Continued from page 2*)

throughout, with the optimum moisture running 18.6 per cent and an allowance of 4 per cent plus or minus from 90 per cent of the optimum.

A fleet of six 13-cubic yard Euclids were loaded in fast time by a Caterpillar 48-inch power-operated elevating grader, delivering the material downhill at a speed up to 28 miles per hour on a long fill where it went in in 6-inch loose layers, was spread by a Caterpillar No. 12 power grader, and compacted by a Bros sheepsfoot roller pulled by a D6 tractor. For roustabout work the contractor maintained a D7 tractor with a LeTourneau bulldozer. The outfit hauled an average of 400 cubic yards an hour on a 1-mile haul and the Euclids returned uphill at better than 20 miles an hour.

At the point where we caught the outfit working, the fill was 74 feet wide, 27 feet high and the cut 28.9 feet maximum.

The Carryall Covey

The group of LeTourneau Carryall scrapers comprised two 15-yard units pulled by D8 tractors, one YR 15 and two 28-yard machines, all three being pulled by D8 tractors. These machines, at the time of our visit, were working south from the big hill, doing their share of the work with shorter hauls than the outfit working to the north. The material was placed in 6-inch layers, as for all of this work, and was compacted by two McCormick-Deering WK-40 rollers with weighted wheels. A Caterpillar D8 tractor was used as a pusher for speeding the loading of the Carryalls.

An interesting note on the operation was the dumping of excavated material some 4 feet above the elevation of the grade to assist in building a surface drainage ditch, so that should rains occur prior to the completion of the grade the water would be carried off to the end of the fill rather than directly onto it. This outfit was in charge of T. J. Schott as Foreman.

Ben Williams was Superintendent for Peter Kiewit Sons' Co. of Omaha, Nebraska, on this grading job.

Missouri A.G.C. Aids State Defense Council

In order to make repairs instantly whenever Missouri public works or facilities may be damaged by war or sabotage, the Associated General Contractors of Missouri has offered to make for the Missouri State Council of Defense an inventory of construction equipment and appurtenances and to keep that inventory constantly up to date.

The information so assembled will be kept on file in the office of the Missouri A.G.C. and will be kept confidential, to be made known only to the State Council of Defense when it has emergency calls for equipment which can not be located by ordinary means, and which is needed to repair damage caused by war or sabotage.

Accordingly, a questionnaire has been sent out to Missouri contractors by the A.G.C. Chapter, requesting a list of equipment owned by each contractor, the type of equipment, and its location. Owners are asked to report immediately whenever any equipment is moved, so that the inventory will be always up-to-date and the exact location of all equipment in the state always on file.

This is an example of real constructive service to community and country, and it is reported that Missouri contractors are enthusiastically aiding in this plan so that the people of their state can count on their help in any type of emergency.

The new Athey Force-Feed loader.

Force-Feed Loader Announced by Athey

A new force-feed loader for cleaning up excess material from road or street surfaces after grading or maintenance work has recently been announced by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill. This loader, for use behind a motor grader, truck or tractor, is also available as a self-propelled unit.

The machine scoops up windrows of earth, dirt, rocks or other materials from the road surface behind the blade of the motor grader and conveys the material over a belt into a truck which is loaded as it moves along. An operator's platform which is convenient to all control levers is provided.

Further information on this Athey force-feed loader may be secured by those interested direct from the manufacturer by mentioning this magazine.

Price Advance Cancelled On Cranes and Shovels

Announcement has been made by the Office of Price Administration that at its request the Koehring Co., Milwaukee, Wis., has cancelled a 5 per cent increase in its prices for cranes and power shovels which was to have become effective on business accepted after January 1, 1942.

In commenting upon the company's compliance with his request, Price Administrator Leon Henderson said: "The action of the officials of the Koehring Co. in cancelling its proposed price increase is tangible evidence that American business can be relied upon to cooperate in the common interest. The company has provided OPA with all factual data necessary for a consideration of the entire case on its merits, and its patriotic contribution to price stabilization in time of war should be a matter of public record."

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The C-86 Paving Breaker is suitable for a wide range of demolition work: cutting out pavement, cement floors, foundations, punching holes through concrete, brick or stone; for laying cables, gas mains, water pipes, street car tracks.

The C-55 Paving Breaker is used where much of the power of a heavy-weight breaker, but the handling ease of a light-weight tool, is demanded.

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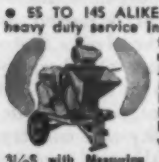

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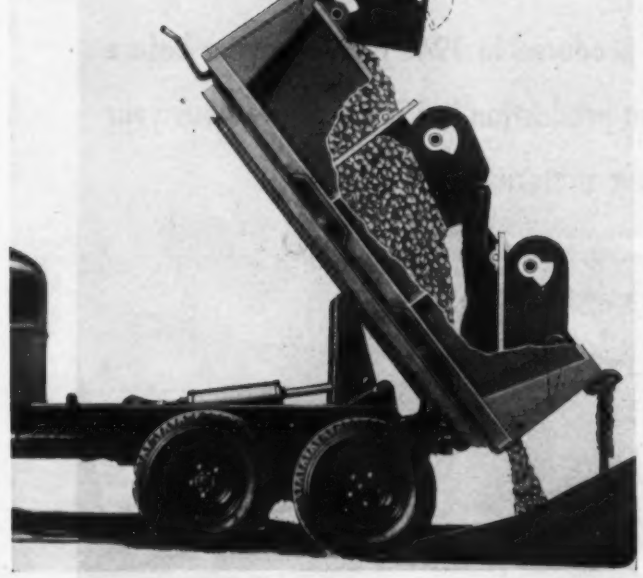


Hercules TURN-O-MATIC Cement Boxes are designed for quick and easy handling of bulk cement, reducing batch equipment to the minimum of weight, space and cost.

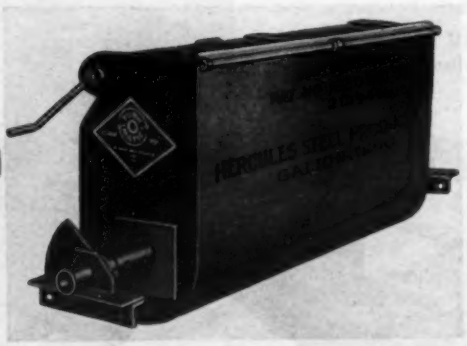
For use with single or multiple batch trucks, Boxes are easily installed close to or against the front of the batch compartments, and deliver cement at the RIGHT time, in PERFECT condition. (TURN-O-MATIC Cement Boxes are watertight.)

TURN-O-MATIC Cement Boxes are shown installed with Hercules heavy duty 10 ft. dump body of 4 cu. yd. capacity.

TURN-O-MATIC

By dumping cement and aggregate at the same time, mixer can be fed systematically and quickly. When the dump body is raised to discharge the batches, Cement Boxes fall back against the aggregate. Off-center position of trunnions usually keeps Boxes upright until this time. Before releasing a batch, the spotter unclamps the corresponding waterproof Box lid by pulling back the lid handle, with a hooked pole. When batch is released, the TURN-O-MATIC Cement Box is automatically inverted, discharging cement at the same time as the aggregate, without splash or dust.

TURN-O-MATIC Cement Boxes may be removed from dump body when using the unit for other types of service.



TURN-O-MATIC CEMENT BOXES
Sizes and Dimensions

	No. 11 (11 C.F. CAP.) FOR 27 C.F. BATCH	No. 15 (15 C.F. CAP.) FOR 34 C.F. BATCH
Length	54″	60″
Width	16″	18″
Depth	27″	29″
Weight	210 lbs.	270 lbs.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

Pouring the Piers Of Peoria Bridge

Great Lakes Dredge & Dock Co. Has Novel Pier Forms And Bracing: Concreting From Floating Plant

(*Photos on pages 1 and 56*)

✦ THE contract for the substructure of the new 4,972-foot steel bridge across 4,000 feet of the Illinois River from Harvard Street in the northern section of Peoria, Ill., to the eastern bank in Tazewell County was awarded to Great Lakes Dredge & Dock Co. on its bid of $589,415.07. The operation called for two pile-bent abutments, one of concrete and one of steel; five land piers on the west end; and twenty-two river piers. Except for slightly varied heights of base and columns all of the river pier operations were practically identical.

The bridge will carry a 26-foot roadway and two 2½-foot sidewalks which are in reality curbs of this width and 10 inches high. The contract for the superstructure was awarded June 13, 1941, to the American Bridge Co. for fabrication, and Strobel Construction Co. of Chicago, Ill., for erection, which will begin in April, 1942.

Cofferdams and Excavation

Because the Illinois River is rather shallow at the site of the bridge, it was necessary to dredge channels in order to move in the floating equipment which was used by the contractor. The pool of the Illinois River at this point is maintained at Elev. 440 while excavation for the foundations of the main channel piers was carried to Elev. 400. The Inland deep web steel sheet piling for the 25½ x 61½-foot cofferdam for Pier 13 was driven by a Bucyrus-Erie steam crane with an oil burner. The crane was equipped with an 80-foot boom, and a McKiernan-Terry 9B3 steam hammer was used for driving the sheeting. Immediately thereafter the cofferdam was excavated to a depth of 40 feet and the material piled outside the cofferdam for later use in backfilling around the footings.

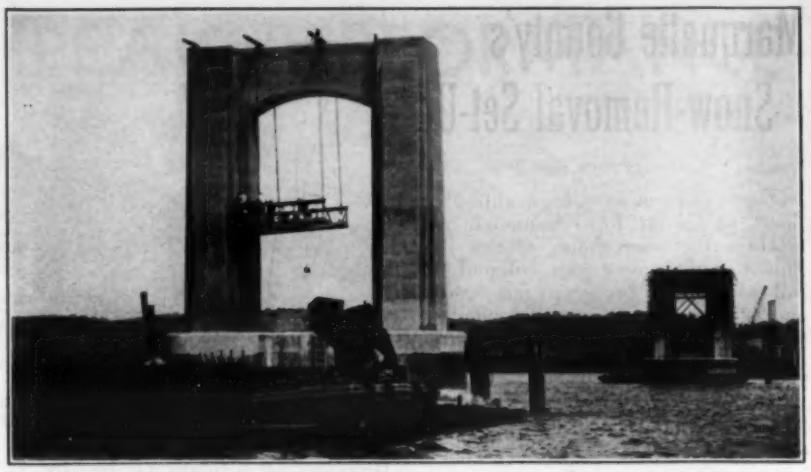
Pile Driving and Seal

The next operation for Pier 13 was the driving of the 110 Carnegie H-beam 12-inch piles 43 feet to rock. These were driven with the same steam hammer, and the outside ring of H piles was driven on a batter. The penetration of these piles per blow was a very accurate indication of the character of the stratum through which the pile was being driven and checked closely with the results of borings at the sites made prior to construction.

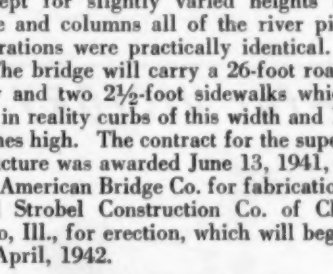
The original plans called for seal coats varying from 3 feet for the shallow piers to 10 feet for the deep piers, but in most cases this was increased. At Pier 13 a 13-foot seal was poured. The concrete was mixed on the plant described below in this article and was placed with a special tremie. This tremie was 15 inches in diameter with a large ball plug at the bottom operated by a separate cable from the one used to swing it by the bale at the top. It was handled by a crane on a separate barge.

As soon as the seal was completed and had set for 7 days, the cofferdam was unwatered, using a Rex 6-inch self-priming centrifugal pump powered with a Waukesha engine, and set at approximately water level, with a maximum 21-foot suction and a 12-foot lift over the top of the cofferdam. This same pump was used to maintain a dry cofferdam during the capping of the foundation piles 1 foot above the seal. The capping was done by electric welding with a Lincoln arc welder. Before the cofferdam was unwatered, heavy frames built to fit the inner dimensions of the cofferdam were lowered by the two cranes. The two bottom braces were made of double 12-inch channels while the top brace was a 5-foot square truss box which eliminated all cross braces at the top of the cof-

(*Continued on page 52*)



Special scaffold for finishing the concrete piers on the Illinois River Bridge at Peoria, Ill.



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Fire Proof—Oil Burning

Hand and Motor driven spray. Many sizes. Write for catalog.

White Mfg. Co.

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AMERICAN CABLE TRU-LAY *Preformed*

HELPS PREVENT ACCIDENTS

60% of industrial safety directors recognize that wire rope can be dangerous for workmen. A great many of them recognize that preformed wire rope is much the safer type.

● Perhaps you can't altogether correct lost-time due to illness—but you can do much to prevent accidents. Take wire rope for instance—many operators have never had a lost-time accident due to punctured hands and subsequent blood-poisoning. But many have—and in these days of emergency demands, any such accident is too many.

American Cable TRU-LAY PREFORMED is the safest possible rope to use. Worn or broken crown wires lie flat and in place. No wicked barbs to tear hands. TRU-LAY resists kinking and whipping, too—thereby handling easier, faster, safer. And acknowledgedly—it lasts longer than non-preformed.

Specify American Cable TRU-LAY PREFORMED — the safer rope. All American Cable ropes identified by the Emerald Strand are made of Improved Plow Steel.

AMERICAN CABLE DIVISION • WILKES-BARRE, PENN.

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

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ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Marquette County's Snow-Removal Set-Up

(*Continued from page 2*)

reference chart at any time enabling the Board of County Road Commissioners to check the whereabouts of any bus. This chart has seventeen columns, as follows: name of township; bus number and trip number; a complete statement of each bus route; number of children carried; round trip in miles; where the bus stays for the night; where the bus stays during school hours; name of the bus driver; bus leaves starting point; bus arrives at school; bus leaves school; bus completes trip; telephone number or location of driver during school hours; telephone number or location of driver after the bus returns home; color used on county map to indicate the route traveled by the bus; name of individual making the report to the Road Commissioners; and date the report was filed. With this information in tabular form, every bus can be quickly checked up as to its whereabouts at any time during the school day, and further, can be checked up at the end of its trip to be sure that the trip has been completed safely. The list of bus drivers' telephone numbers makes check-up easy.

The importance of all of this care can be better understood when it is realized that one bus line runs for 13 miles of its 37-mile run without a building or habitation in this stretch. Another bus makes a run of 45 miles, 90 miles in one day, for a child at the end of the township. To further insure the safety of all school buses, a Call Sheet is made out at the beginning of each winter, with the names and telephone numbers of all of the schools, the city and state police, the bus lines and hotels. A series of blank columns after this information leaves space for the dates of storms which necessitated putting through emergency calls to the schools recording the date and the exact time the call was answered by the school or other office. These telephone warnings are issued so that rural children may be dismissed and the buses return all rural children safely to their homes before a storm breaks in full severity. During the winter of 1940-41, emergency calls were sent out to the schools, mines and the remainder of the numbers on the Call Sheet on December 16, January 17, January 21, February 7, and February 12.

C. & E. M. Photo

The large and efficient headquarters garage of the Marquette County Highway Department located on the outskirts of Ishpeming, Mich.

It is the policy of the Marquette County Highway Department to start fighting the snow just as soon as an unfavorable weather report is received. The equipment is hooked up, schools are notified to dismiss children from rural points and all is put in readiness for plowing. One storm warning received last winter came at a time when most of the men were at the garage, and fourteen plows were hooked up to the motor equipment and were on the road 25 minutes after the weather report was received.

Highway Organization

The Board of County Road Commissioners of Marquette County, Michigan, consists of three Commissioners appointed by the Board of Supervisors, one each year for a three-year term. This particular Board was created by a special act of the State Legislature antedating the general county road law of 1909. The Board employs the County Engineer-Superintendent for a two-year term. The present Engineer-Superintendent, K. I. Sawyer, began his service with the County in this capacity on January 1, 1916, and has been Engineer-Superintendent ever since. For three years prior to entering the employ of the County, he was a District Engineer for the Michigan State Highway Department; and for five years prior to that he was Engineer-Superintendent of Highways in Menominee County, which is located immediately to the south of Marquette county. The present Road Commissioners are P. B. Spear, Sr., Chairman, R. F. Archibald, and S. R. Elliott.

(*Continued on next page*)

CUMMER

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Portable Combination Hot and Cold Mix Plants

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Stationary Combination Hot and Cold Mix Plants

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Steam Jacketed Mixers 400 to 8000 pounds capacity.

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Euclid and 17th, Cleveland, Ohio

ENGINEERED *by* BUTLER—*for VICTORY*

Now, more than ever, in this hour of national emergency, construction must proceed speedily, efficiently, and accurately. Now, more than ever, builders are calling upon Butler engineers to help solve their problems and Butler equipment to help do their work. Whether for a concrete plant, transit plant, concrete block plant, sand and gravel plant, bulk cement plant, or batching bin, consult Butler engineers today.

Plants like this 122 cu. yd. four compartment bin mounted on a barge manufacture concrete for the Navy from Pearl Harbor to Greenland.

Three compartment 40 cu. yd. batching bin loaded by a crane.

Bulk cement plant and sand bin batching to pavers.

This transit plant at the Elwood-Kankakee ordnance project set a new record in batching speed: 230 yards per hour from a single 5-yd. agra-cement batcher.

Recently installed for the Erie Materials Company, Fort Wayne, Ind., this large seven-compartment transit plant is one of the most efficient in the country.

BUTLER BIN COMPANY • WAUKESHA, WISCONSIN

County Financing Of Highway Program

(*Continued from preceding page*)

County Highway Mileage

There are 1,245.5 miles of highway maintained at county expense, and 139.9 miles of state trunkline roads maintained by the county under contract with the State Highway Department, making a total of 1,385.4 miles of roads for which the County Highway Department is responsible. In 1931 the McNitt Act of the State Legislature required the counties of Michigan to take over 20 per cent of the town road mileage each year, and then in the sixth year to take over the maintenance of all streets and alleys in unincorporated cities and villages. Prior to this, by the Ming Act, the State Highway Department had absorbed about two-thirds of this county's highway mileage to create a state system.

The following table shows the mileage of roads, streets, and alleys in the highway system of Marquette County, Michigan:

Primary roads, numbered	247.9 miles
Secondary roads, lettered	961.5 miles
Village streets	31.2 miles
Village alleys	4.9 miles
Total maintained at county expense	1245.5 miles
State trunk roads maintained under contract by county	139.9 miles
TOTAL	1385.4 miles

The following table shows the types of road surface on both the county road system and the state trunk roads maintained by the county:

Type of Road Surface	*County System*	*State System*
Earth	776.99	—
Gravel	396.32	18.60
Surface seal	66.90	56.18
Penetration macadam	5.15	28.85
Concrete	0.10	36.30
TOTAL	1,245.46	139.93

Financing the Roads

The funds available for the construction and maintenance of county roads, streets, and alleys come from several sources. There is a real property tax of 2.2 mills levied by the county itself. The motor vehicle weight tax, payable by owners to the state, is returned to the county as follows: one-eighth of the total amount received is divided evenly among the eighty-three counties of the state, and the remaining seven-eighths is distributed pro rata according to the amount of tax paid in. The sum of $4,000,000 is taken from the receipts of the state gas tax and is returned to the counties pro rata to the weight tax. Another source of income is the McNitt Maintenance Refund, amounting to $2,500,000 per year, divided among the counties pro rata according to the mileage of roads which each county took over from the townships under the McNitt Act of 1931. An additional sum of $200,000, known as the Snow Fund Return, is taken by the state from the gas tax collection and is distributed to those counties having over 60 inches snowfall the previous winter, and is distributed in proportion to the mileage of county highways and the depth of snowfall.

The weight and gas tax as received by the county must be used in a specified manner. The first half may be used by the county in any manner needed in its highway work, while the second half must be used first to pay off old road bonds, indebtedness on streets and alleys, and then the balance is divided between the county and the incorporated cities in proportion to the population.

It is interesting to note that in Marquette County the entire fixed plant, covering all of the garages and service buildings as well as warehouses, was not paid for from tax money but represents earnings on the use of county road equipment through an hourly rental system. Each piece of equipment has a ledger sheet showing the initial cost of the equipment, all charges against it for repairs, gasoline, and oil, its hourly rental rate, and its earnings and on what job earned.

The table on page 46 shows the total funds available for the maintenance of streets, roads, and alleys in Marquette County for the years 1939 and 1940.

County Garages

Marquette County maintains a Headquarters Garage at Ishpeming, which is at the approximate geographical center of the county, and four District Garages. At Big Bay there is a frame-structure storage garage and yard. Plans are already under way to build a stone storage garage for this district. At Skandia there is a 50 x 60-foot cinder-block garage with a lean-to, and an old commercial garage which is used for a warehouse. At Gwinn there is a 50 x 60-foot rubble-masonry storage garage with a lean-to and a small storage yard. At Republic, an old brick mine building is used for the shop and garage, and a stucco mine building for a warehouse.

Each district has a District Foreman

(*Continued on page 46*)

PEAK PERFORMANCE

Road Building with a Schramm Compressor at 5,000 ft. altitude.

THE SKY'S THE LIMIT . . . when using the MODERN SCHRAMM COMPRESSOR . . . Operates just as efficiently at HIGH ALTITUDES as at SEA LEVEL.

PERFORMANCE Records in every field are evidence of their high quality and the years of experience behind them. Built in sizes from 20 to 420 cu. ft. actual air.

Write for Catalog 42-P

SCHRAMM, INC. WEST CHESTER, PA. DEALERS IN PRINCIPAL CITIES

EASY BUCKET SPOTTING WITH KOEHRING *Boom Control*

KOEHRING *Boom Control is Accurate*

Quick and easy clamshell or dragline bucket spotting saves seconds with every load. Accurate boom control . . . Koehring control . . . is reason why Koehring cranes have advantage of high speed loading or unloading . . . in batching plants . . . car unloading . . . handling concrete buckets . . . in industrial plants. Easy steering permits quick travel direct to operating location. No time lost "jockeying" for position. Boom operation and hoisting while swinging or traveling is another important second-saver. The many time-saving advantages of Koehring means speed on the job . . . more production per hour.

KOEHRING COMPANY • *Milwaukee, Wisconsin*

HEAVY-DUTY CONSTRUCTION EQUIPMENT

The Buggymobile.

New Motorized Unit For Placing Concrete

Included in the motorized concrete equipment made by Mixermobile, Inc., 608 So. Hill St., Los Angeles, Calif., is the Buggymobile, a mobile unit on which is mounted a concrete hopper and chute for delivering concrete direct to the forms. Available in two sizes of ½ and 1-cubic yard capacities, the Buggymobile is a piece of automotive equipment which can move around the job with speed, delivering the concrete wherever it is needed, and eliminating the need for setting up a hopper and chute and then shifting it constantly.

The ½-yard unit is powered by a Ford 4-cylinder 40-hp motor and has four forward speeds and one reverse. It is 9 feet 5 inches long, 4 feet 6 inches wide, has a wheelbase of 6 feet 3 inches, and is mounted on three tires, two in front and one in the rear. The hopper is raised hydraulically and has a discharge height of 3 feet 6 inches above the ground. The chute is 2 feet 6 inches long. The 1-cubic yard Buggymobile is similar in construction, is powered by a Ford 90-hp motor, is 11 feet 10 inches long, 6 feet 1 inch wide, has a hopper lift of 3 feet, a discharge height of 4 feet, and a 3-foot chute.

When the hopper is in raised position, the concrete may be discharged straight ahead or over either wheel. The unit may be operated with or without the chute, but it is not necessary to remove the chute in order to discharge directly from the hopper discharge spout.

A 4-page folder, illustrating and describing the Buggymobile as well as the Mixermobile, the complete portable concrete mixing plant, may be secured by those interested direct from the manufacturer by mentioning this item.

A Hot Water Supply For Winter Concrete

A new portable water heater, of sufficient capacity to provide hot water for the operation of dual-drum pavers and capable of delivering 50 gallons per minute, has been announced by W. G. Chausse, 4453 14th St., Detroit, Mich. The entire unit is mounted on a Chausse 4-wheeled pneumatic-tired trailer and consists of a brick-lined fire box with the circulating coils enclosed in an insulated steel house and heated by oil burners. These burners are fed by a fuel pump powered by an air-cooled gasoline engine equipped with a 150-gallon fuel pump and a 20-gallon auxiliary fuel tank with hand pump.

The heater may be connected to the water pressure line or fed by a water pump, which can be mounted on the heater if desired. A by-pass valve returns the hot water to a storage tank or tank wagon when not actually feeding the paver. The manufacturer states that by adding an asphalt pump and engine this water heater may be used as an oil heater for circulating hot oil, up to 500 degrees, through the coils of tank cars, in place of steam, thus converting the unit to a tank-car heater. Full information may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY by writing to the manufacturer and referring to this item.

New Respirator Is Light, Easily Cleaned

The new improved M.S.A. single-filter Dustfoe respirator, recently announced by Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Penna., is featured by the new single filter which replaces the two-part filter used previously. The new filter is all in one piece, giving Bureau of Mines-approved protection against an even broader range of dusts and mists, according to the manufacturer. The filter is more porous on the outer side so that the larger dust particles are filtered out first, thus preventing rapid build-up of breathing resistance through clogging of the filter.

Other features of the Dustfoe respirator include its compactness, light weight, low breathing resistance, full vision in every direction, and a formable face piece which may be shaped to fit individual face contours. A protective filter cover prevents contamination of the filter by grease and dirt from hands or equipment, and a foolproof exhalation valve of the leak-proof army gas-mask type provides drainage. The respirator is easily cleaned as all parts can be washed and sterilized, except the single throw-away filter which permits a fresh new filter with every cleaning.

A new bulletin, No. CM-5, completely describing the Dustfoe respirator, may be secured by those interested direct from the manufacturer.

Make

ROADS SAFE

BY removing slush and ice from paved and black top roads with a BURCH TRUK-PATROL. It is also invaluable for road and shoulder maintenance. Many new and exclusive features such as Hydromotor moldboard control, center draft, draft bar attached to a front frame hitch that can also be used for Ross snow plows.

Write for Bulletin B.T.P. 1

Manufactured by

The BURCH CORPORATION

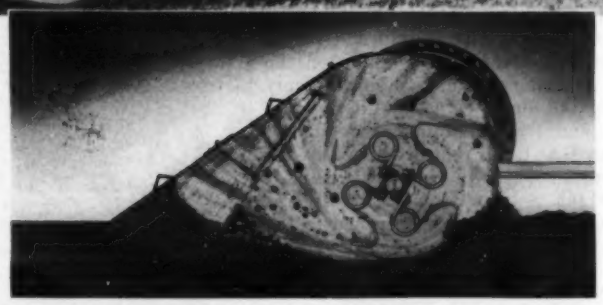
Crestline, Ohio

Builders of Equipment for over fifty years

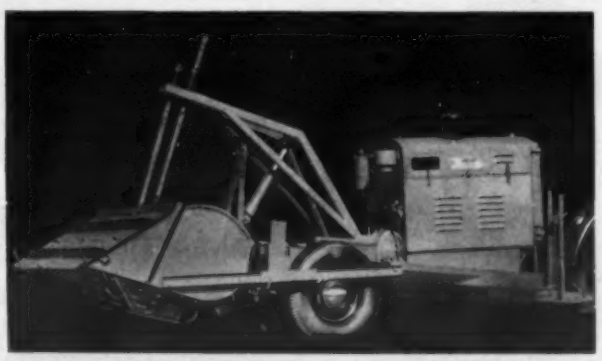
HARNESSING A GREAT POWER PRINCIPLE — ROTARY FORCE

The most powerful and violent manifestation of Nature is the tornado. That principle of rotary power, — directed and controlled, — is the factor that makes the SEAMAN PULVI-MIXER a remarkably efficient development.

Since their first application in 1938 to mixing problems in highway stabilization, the tremendous growth in the production of SEAMAN PULVI-MIXERS is due to the wide range of new applications and their importance as a cost-saving means to better stabilization.



It's the rotary principle that delivers a hitherto unknown thoroughness of mix. The tines, driven at great velocity literally create a tornado of the materials to be mixed. It is obvious that in meeting the sharply deflecting surface of the hood, the materials must mix with great rapidity and thoroughness.



SEAMAN PULVI-MIXERS are made in two basic models — the tractor driven and the Motorized. Above is shown the Motorized Unit (Model MHD-72) with self contained power unit.

The SEAMAN PULVI-MIXER has established itself as first choice in a wide field of applications. Among many, its use in soil-cement construction has markedly reduced costs and given greater control to the process. Sand asphalt, asphalt emulsion, sand clay and bituminous stabilization processes are noteworthy cases in which the SEAMAN PULVI-MIXER has proved itself the most efficient tool.

SEAMAN engineers welcome an opportunity to cooperate in stabilization problems. Write to

SEAMAN MOTORS MILWAUKEE, WIS.

Penetration Paving On Conn. Main Route

Improvement of U. S. 44 in Abington Completed with a 28-Foot Top by M. A. Gammino Const. Co., Providence, R. I.

(*Photo on page* 1)

✦ THE "unclassified excavation" item on the 6-mile grading, drainage and paving contract on U. S. 44 through the Four Corners at Abington, Conn., turned out to be a snake in the grass which delayed the completion of the penetration-macadam paving. The rock in this item, originally estimated at 25,000 cubic yards, reached approximately 75,000 yards before the grading was completed by M. A. Gammino Construction Co., Providence, R. I., contractor for the entire project. Designed as a balanced job for cut and fill, the excess of rock required a number of spoil piles and extra roadside work. The story of the grading problems has already been published (C. & E. M., Jan., 1942, page 2).

The Gravel Sub-Base

Upon the completion of the grading, the contractor was required to place two 6-inch layers of pit-run gravel in all cuts and four 6-inch layers in all rock cuts, including the shoulders, as a subbase for the penetration bases and surface treatment. The story behind the major borrow pit at the east end of the job is of considerable interest and has some historic background. Mashmoquet Brook was a rather respectable stream confined to its original streambed until the New England floods of 1936, when it started to create other channels. When the famous New England hurricane of September 21, 1938, swept across Connecticut, Mashmoquet Brook completely left its old streambed and opened numerous meandering channels through a meadow to the north of its original channel.

As part payment for the gravel borrow for the gravel sub-base, the contractor built a 200-foot dike from 7 to 9 feet high to divert the brook back to its old channel. The dike was cast up by a Northwest ¾-yard shovel, and the slopes finished by an International TD-14 tractor with a Bucyrus-Erie bulldozer.

The borrow pit was actually located among the divers flood channels of Mashmoquet Brook, where the gravel was loaded by the ¾-yard Northwest shovel into three Model ER Mack trucks, four Ford trucks, and one Chevrolet, General Motors and Mack Junior trucks. On the grade the material was spread by a D4 tractor with a La Plant-Choate bulldozer and a Caterpillar No. 110 power grader, and compacted in 6-inch layers by a Buffalo-Springfield 14-ton power roller.

Hauling Crushed Stone

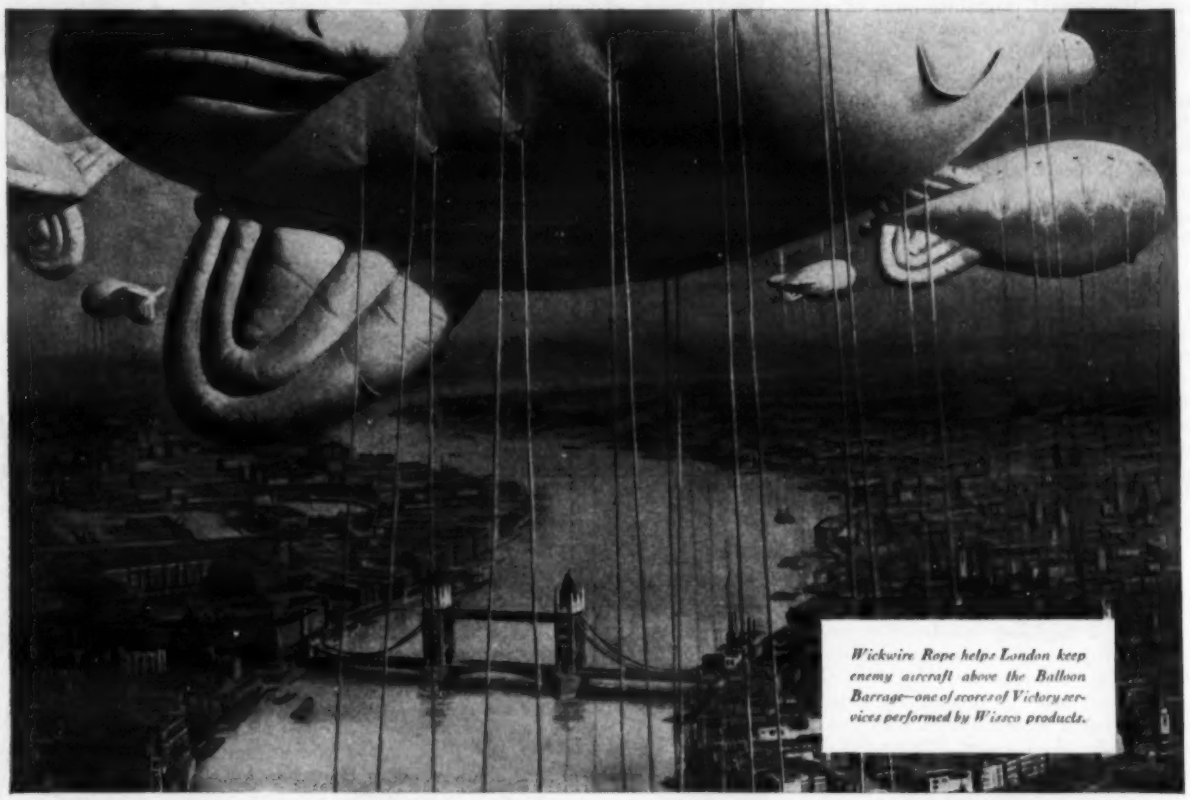
The crushed stone for the base courses and the penetration top was prepared by the New Haven Trap Rock Co., and delivered in hopper-bottom cars at Elliott station of the New York, New Haven & Hartford Railroad on the Willimantic short line. This location is 2 miles from Abington Four Corners, which is near the east end of the job. The producer delivered 10 or 14 cars daily, with a maximum of 74 tons per car and an average of about 65 tons, taking into account the varying sizes of cars available. The unloading of the crushed stone and hauling to the job was done under a subcontract by Burke Bros. of Providence, R. I. The subcontractor used a Burch unloader, working from a pit beneath the track and delivering direct to his hauling trucks. The hauling fleet consisted of Burke's four BX and one AC Mack trucks and two of the fleet of new Autocars owned by M. A. Gammino Construction Co. The cars were spotted by the shifting engine on a 95-car passing siding, and were shifted by the hauling trucks and a cable, aided by a slight downgrade going east. Two men were kept in the cars to clean them, as the demand for cars of this type was so great that the railroad resorted to the use of cars that had been considered obsolete for some time.

The Base Courses

The crushed-stone base courses for the pentration top consisted of two 3-inch compacted courses of ½ to 2-inch stone, dumped from the tail-gate of the hauling truck and then spread with a Caterpillar No. 110 diesel-powered grader. The contractor prefers this method of spreading, as it rolls the stone and cleans it of surface fines and dust which may have accumulated during handling. Following the blade spreading of the base material, a foreman with four stone spotters with forks went over the base to insure its evenness. Following this, ten men hand-cast dry sand over the surface while four Buffalo-Springfield 3-wheel 12 to 14-ton rollers with drag brooms on their scarifier frames rolled the base course. One of the illustrations shows the ingenious

(*Concluded on page* 29)

C. & E. M. Photo
One of the 3-wheel rollers showing the broom drag and control used by M. A. Gammino.


Wickwire Rope helps London keep enemy aircraft above the Balloon Barrage—one of scores of Victory services performed by Wissco products.

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FROM LONDON'S BALLOON BARRAGE!

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The message is: VICTORY NEEDS *STEEL!* Victory needs night and day all-out efficiency in every industrial operation. Wire rope that fails too soon wastes steel. The time wasted replacing it is a red stop light on Victory.

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The long life of Wickwire Rope begins with skillful production of the metal in our own blast furnaces. It continues through proud care and precision methods in drawing the wire, and laying the rope. Wickwire representatives give expert help in advising on the best type of rope for each use. And after delivery, Wickwire Service in the field continues to work with you, to assure longest life on the job.

• • •

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A FOOT OFF may make your rope last longer. Constant bending and unbending around a sheave will finally wear out any rope. A foot off the rope redistributes the wear. This and forty more rope life-savers are pictured and described in our booklet, "Know Your Ropes."

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Effect of Priorities On Road Construction

(*Continued from page* 1)

the economic aspects tend to overshadow military strategy. Victory or defeat depends quite as much on decisions made in the council rooms of business and civilian agencies of government as upon those made by military staffs. It is in the light of such facts that the individual business man today must assess the nature of his opportunities.

With this in mind, it should be clear that activity in the civil-engineering construction field will change radically in character in the months ahead, but it will continue on a substantial scale. Priorities and allocations, along with the other economic controls wielded by government as war measures, have two major objectives. The first is maximum production for war—that is, maximum production of the actual implements of war. The second is maintenance of an adequate flow of essential civilian supplies and services.

Much new construction is certain to result from the purely military program. There will be new training camps, new airfields, new industrial centers and housing projects, all of which require roads, bridges, power plants and other large-scale developments in the civil-engineering field.

Both the military and civilian programs place a premium on an adequately maintained highway system. Neglect here would be suicidal. The dominant position of rail transportation in time of war came to an end with creation of panzer divisions. Poland and France will long remember this. As the present all-out war effort expands, a new emphasis on the importance of highways will displace the comparative absence of concern which characterized the "defense" program.

Priorities and Allocations

Priorities and allocations strike most crucially at highway construction and similar projects in two separate ways: (1) actual construction, repair and maintenance, and (2) manufacture and procurement of materials and machinery necessary for the former. The first is of especial interest to those governmental units and construction companies carrying out road building and repair work. The second is important not only to firms manufacturing the equipment, but also to the users of the machinery and supplies.

It is vitally necessary for a construction firm to know what chances its suppliers have of producing on time material and machinery which the construction firm needs to perform its work. If the construction firm should order road-building equipment from a manufacturer who is tied up with a vast amount of work for—let us say—the Corps of Engineers, then the chance of getting the equipment is small. Road builders are interested not only in the priorities which they receive for their work, but also in priority ratings which reach their suppliers from other customers.

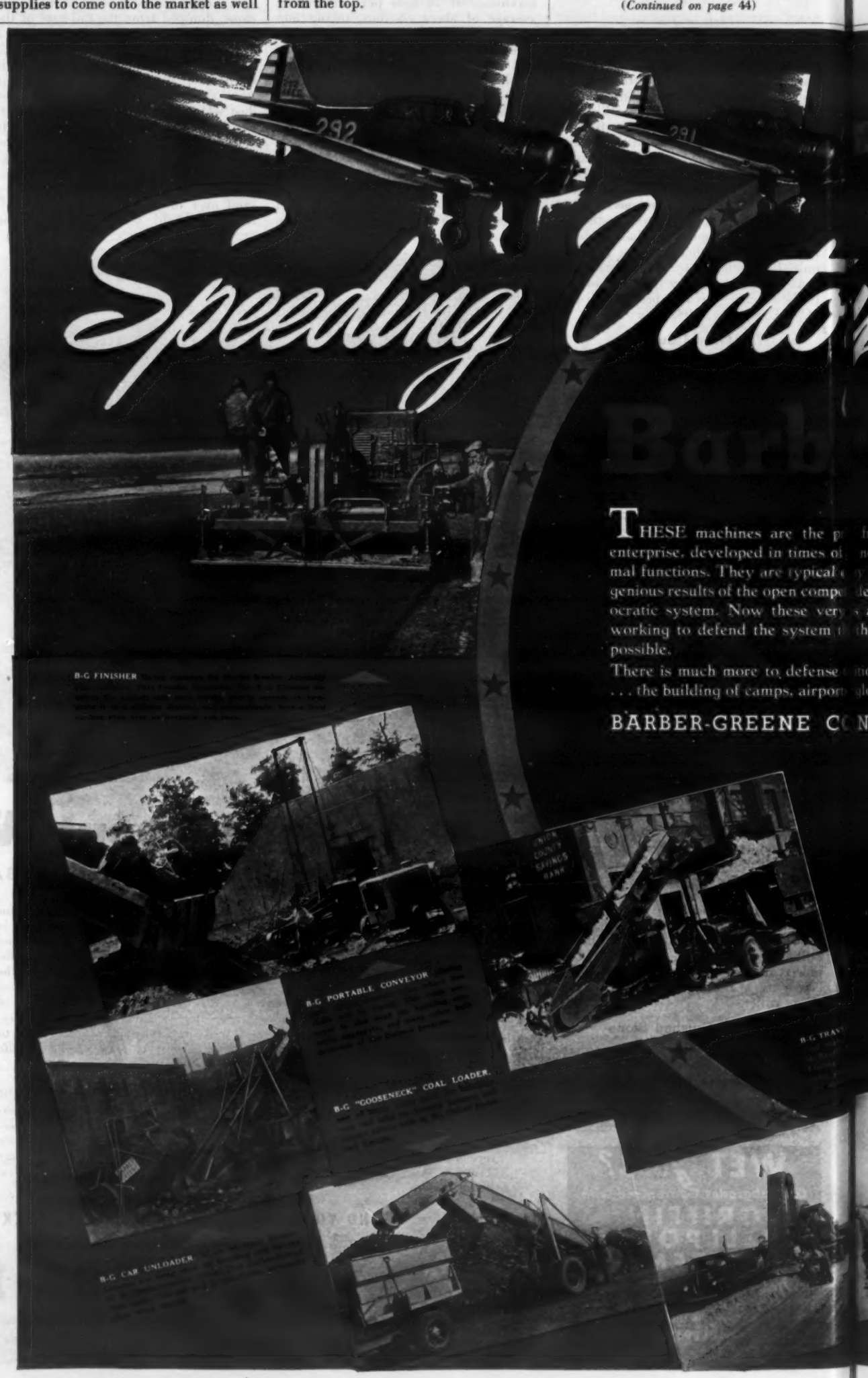
Though application of rigid industrial controls will be greatly intensified under conditions which now prevail, their general character is already well defined. The expectation is that the system of allocations now taking form will largely supplant the priorities system. But priorities should be viewed not only as a transitional stage to allocations but as a supplementary control.

Briefly stated, allocations represent a system of control of scarce materials which releases specified quantities to specified customers for delivery at specified times for specific uses. Though the responsible authorities in Washington have declared for an all-out allocations program, it will be at least several months before it can be made to operate. Before that can come about, government must have virtually complete data covering supply of all scarce materials. It must match that information against the production program. It must have the executive and engineering skill to make the information effective. A full-fledged allocations system will mean that all scarce materials are controlled at the source. It calls for accurate estimates of supplies to come onto the market as well as of stocks on hand.

Until this information can be gathered, digested and made effective, industry must live with priorities, and even then allocations can not do the whole job. In the construction field, the project rating system will continue to play a dominant role. One way of explaining the general set-up is to say that allocations get behind materials and push them up from the bottom. Priorities take hold at the other end and pull them up from the top.

The materials allocated at the manufacturing level in the construction field, whether it is road machinery or what, will be limited by the number of individual project ratings granted at the construction level. Manufacturers will be allocated sufficient quantities of materials to provide the equipment and other supplies necessary to support the volume of activity covered by the project ratings issued. This applies to repair and maintenance programs in just as vital a way

(*Continued on page* 44)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THESE machines are the p
enterprise, developed in times o
mal functions. They are typical
genious results of the open compe
ocratic system. Now these very
working to defend the system
possible.
There is much more to defense
. . . the building of camps, airpor
BARBER-GREENE C
B-G FINISHER
B-G PORTABLE CONVEYOR
B-G "GOOSENECK" COAL LOADER
B-G CAR UNLOADER

Arc Welding Cost Booklet

By the use of the new Airco "Electrode Consumption Calculator" the cost of arc-welding electrodes can now be estimated rapidly for welding any type of joint on any thickness with either bare or coated electrodes. Just recently published by Air Reduction, 60 East 42nd St., New York City, this helpful booklet tells how many pounds of electrodes are required per linear foot of weld. The calculator includes consumption figures for both bare and shielded-arc electrodes on all metal thicknesses commonly employed in making fillet welds, square groove butt joints, V and U groove butt joints, bevel grooves and J grooves. The amount of steel deposited per linear foot of weld is also shown, and as a further aid on other joints not shown, the basic formulas used in these calculations are included.

Copies of this booklet may be obtained by writing direct to Air Reduction and mentioning this item.

Louisiana Files Claim For Damage to Roads

The Louisiana Department of Highways has filed a claim for $2,013,689.30 with the U. S. Public Roads Administration for damage done to state highways during military maneuvers this past summer and autmn.

Highway Highlights reports that field men with automatic recording instruments found that traffic in the area during the maneuver period rose from a daily average of 40,762 vehicles to 95,023 vehicles. This is an increase of 133 per cent above the traffic volumes recorded at the same points during 1940.

Promotion at Brownhoist

The Industrial Brownhoist Corp., Bay City, Mich., announced that at a meeting of the Board of Directors, held December 17, 1941, James B. Hayden was elected Vice President in Charge of Sales.

with
Greenes
– a thousand major products – requiring almost every commodity used in our normal life – now required in a sudden rush of multiplied quantities. The ingenuity and unequalled efficiency of American products combined with the American spirit is responsible for the rapid progress of the defense program – a spirit that is showing the difference between being pushed together, and pulling together.
AURORA, ILLINOIS, U. S. A.
B-G DITCHER
B-G PERMANENT CONVEYORS
B-G BUCKET LOADER
B-G COAL LOADERS
B-G BITUMINOUS CENTRAL PLANT

Equipment Manufacturers Speed Up War Production

(*Continued from page* 1)

materials for 1942, as nearly as anything can be predicted in this unpredictable state of world affairs.

Accordingly we have requested the manufacturers and producers of equipment and materials for the construction field to tell us something of their present status, how war production is affecting them and consequently their production for our field, what are the chances of securing needed equipment during the coming year, what about spare parts, and how to make present equipment and materials last longer. In this article we pass on to you the information thus secured direct from manufacturers in the heavy construction and road-building industry who replied to our questions.

War Production

Since the primary job facing American industry today is that of production for war, this includes the manufacturers of all types of construction equipment as well as all other manufacturers. In some cases, manufacturers in the construction field have converted parts of their plants or expanded them to take on the production of armaments in addition to their regular line. For example, Armco Drainage Products Association is producing corrugated metal ammunition igloos, air-raid shelters, bin-wall barricades for ordnance plants, in addition to stepped-up production of its regular line of drainage products for airports, military and naval establishments, and for necessary highway work. The Firestone Tire & Rubber Co. is making anti-aircraft gun mounts, gas masks, tank treads, barrage balloons, self-sealing fuel tanks, and tires for airplanes, scout cars, and Army motorized equipment as well as tires for trucks and various types of construction equipment.

The Allis-Chalmers Mfg. Co., Austin-Western Road Machinery Co., Wm. Bros. Boiler & Mfg. Co., Duplex Machinery Co., E. D. Etnyre & Co., Gardner-Denver Co., B. F. Goodrich Co., Hardsocg Wonder Drill Co., Hauck Mfg. Co., Heltzel Steel Form & Iron Co., Keystone Driller Co., Kinney Mfg. Co., McKiernan-Terry Corp., Municipal Supply Co., Ransome Concrete Machinery Co., W. A. Riddell Corp., Rotary Snow Plow Co., Tarrant Mfg. Co., Union Metal Mfg. Co., and Waukesha Motor Co. all report extensive war production work outside of their regular lines for use in the construction field.

Most other companies in the field have continued the manufacture of their regular lines, at a greatly increased rate, because that equipment is necessary in the war effort and that seems to be the greatest contribution which they can make. Aeroil Burner Co., Inc., reports its factory is working 24 hours a day, with 85 per cent of its orders carrying defense ratings. At Barber-Greene Co., 100 per cent of its production is devoted to National Defense and has been for some time; Buffalo-Springfield Roller Co. reports that road rollers for compacting embankments and for paving military highways and airport runways are so important that there is little likelihood of that company's having any surplus capacity to devote to any other war materials. About 50 per cent of its production is for the Government and the remainder for contractors on defense construction and state and county highway departments.

Byers Machine Co.'s production of shovels and cranes is 100 per cent for defense work, many of their machines being sent to Central and South America, Canada, Hawaii and to defense outposts. The Celotex Corp. plants are operating at full capacity for the production of its regular line for wartime construction purposes. Because of the fact that the C. H. & E. line is used so extensively in defense construction and as Army Engineer Corps equipment, that company has been devoting about 85 per cent of its production to defense and expects that to be stepped up to 100 per cent very shortly. From 90 to 95 per cent of the Cleveland Formgrader Co.'s output is for defense construction and this company states that its equipment may be found on airbase and defense jobs from South America to Labrador. Norris K. Davis, Inc., is devoting its war efforts to making Rotoblade snow plows for use at airports; Flexible Road Joint Machine Co. is working at capacity on its regular line of equipment for use at air fields and other defense projects; and Gatke Corp. is producing large quantities and a great variety of products for the Army, Navy and defense jobs.

Hazard Wire Rope Div., American Chain & Cable Co., reports that it is operating with little change in its regular line but at maximum capacity for defense requirements. During 1941, 60 per cent of the production of Hercules hydraulic hoists and dump bodies, cargo and cargo dump-body units was for the United States and Allied Governments; Independent Pneumatic Tool Co. is concentrating on increased production of its regular line; while Jaeger Machine Co. reports that its total pro-

(*Continued on next page*)

RED DEVIL LIGHT and POWER PLANTS
800 to 50,000 WATTS

3,000 WATT as illustrated on Pneumatic Tires $445.00

Finish the job quicker and save money with electricity.

Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
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Long Island City, N. Y.

...and now
CHEVROLET
announces a great nationwide
"Truck CONSERVATION PLAN"

To help keep America's trucks serving America for the duration

Conserve TIRES
Conserve GAS
Conserve OIL
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Conserve TRANSMISSION
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Conserve BRAKES
Conserve EVERY VITAL PART

Trucks are playing a vital part in America's Victory Program . . . serving agriculture—serving industry—serving all America. . . . Keep *your* trucks on the job by taking especially good care of them—by having regular service "check-ups"—and by deciding to adopt Chevrolet's "Truck Conservation Plan."... See your Chevrolet dealer for full details—*today!* Remember—Chevrolet dealers service all makes of trucks.

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT, MICHIGAN

A MOBILE NATION IS A STRONG NATION

Always SEE YOUR LOCAL CHEVROLET DEALER FOR SERVICE

Defense Work Takes Bulk of Equipment

(*Continued from preceding page*)

duction, almost 100 per cent in excess of normal, is of its standard equipment for defense construction, with some slight adaptations to meet special Army and Navy requirements. At least 75 per cent of the products of the C. S. Johnson Co. is being used on defense construction projects such as munition dumps, cantonment camps, shell-loading plants, and similar work. Killefer Mfg. Co. reports that its equipment for processing soil-cement is being used in the construction of airport runways, its wire-laying equipment in the construction of telephone and power lines, and states that its line of agricultural equipment is also very important under present conditions. The LaCrosse Trailer & Equipment Co. is working practically entirely on government orders, and the LeRoi Co. is also engaged almost 100 per cent in defense production. Many products of R. G. LeTourneau, Inc., are playing their part in defense construction, and this company has recently brought out a tractor crane for Army use.

A tremendous increase in the importance of arc welding has been brought about by the war effort and therefore the Lincoln Electric Co. feels that its greatest contribution can be made by concentrating on its regular line of arc welding equipment, the only change being a faster tempo of production to meet the needs for such products. Marlow Pumps and Page Engineering Co. are concentrating on their regular lines, much of which is going for defense construction, while Richmond Screw Anchor Co., Inc., is working 23 hours a day supplying the need for its type of product. Standard Steel Works of North Kansas City, Mo., is making bituminous pumps, tanks, distributors, sprinkler tanks and flushers, and similar equipment for the Lend-Lease Administration, the War Department, Army Air Corps, and the Navy Department, and Stephens-Adamson Mfg. Co. has merely stepped up production of its standard line, furnishing conveyors, elevators and transmission equipment for many firms who are actually producing war equipment, in addition to the conveying equipment in use in construction jobs.

About 86 per cent of the Tuthill Spring Co.'s output is under priority ratings, while practically the entire line of the Universal Road Machinery Co.'s construction equipment is going to defense jobs. Another manufacturer of welding equipment, Victor Equipment Co., reports that over 90 per cent of its production is going directly to defense industries, the Army, Navy, and Maritime Commission, and that this production is a 250 per cent increase over that of 1940. White Mfg. Co., also sticking to its regular line of equipment, is devoting about 91 per cent of its production to defense construction, while Willett Mfg. Co. reports that a large part of its production has been going into the defense effort.

In the field of materials, the story is rather similar. The Barrett Division, Allied Chemical & Dye Corp., continues to produce paving materials and in addition manufactures many chemicals used for war purposes. The Standard Oil Co. of California reports that it is greatly increasing its production to take care of the Government's needs as well as contractors' and state and county needs during the emergency, and a similar report comes from The Texas Co. The Kotal Co. has developed a waterproofed and pigment-colored stone for camouflaging airport-pavement surfaces, and in addition is producing Kotal for bituminous stockpile mixes.

The paving brick manufacturers have stepped up production to take care of the additional requirements for defense construction, but here is a field in which there are no shortages of materials and the manufacture of paving brick will continue as usual. Prismo Safety Corp., manufacturer of reflecting material for safety signs and traffic stripes, is another concern not yet suffering from material shortages, but reports a considerable increase in the use of its products because of the war.

What of Our Field?

These examples of American manufacturers devoting their full capacities and best efforts to war production gives one a warm glow of patriotic pride, but it also brings up the question of the outlook for the construction industry for the coming year. Is there going to be enough equipment for use in our field?

The answer to this, like the answer to practically every other question on

(*Continued on page 48*)

Sure, WE STERLINGS CAN "TAKE IT" because WE ARE BUILT THAT WAY!

Wherever there's a 1942 construction job, whether it demands 24-hour war emergency schedules or normal working hours, STERLING WHEELBARROWS have the stamina to "take it" and can be depended upon to render "Distinguished Service." They are engineered and built to meet any super-strain that the construction industry calls for. They provide the SIMPLEST, RELIABLE, LOW-COST METHOD of material-transport. In war-time or peace-time construction, rely on STERLINGS to carry the loads.

BRANCHES at New York, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, St. Louis . . distributors and dealers in principal cities.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

STRONG AS A WALRUS...

supple as a seal

Rugged durability is combined with smooth, easy handling in Bethlehem Purple Strand Form-Set Wire Rope.

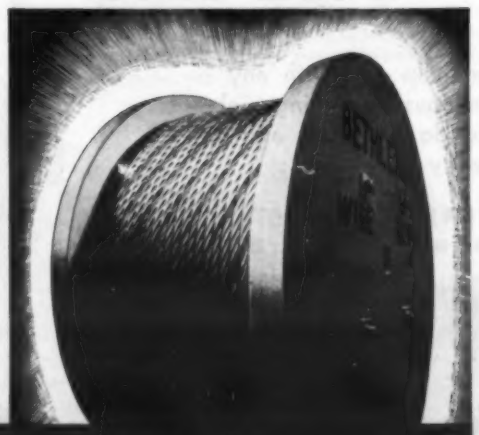
The Purple Strand means that the rope is made of 100 per cent improved plow steel—the toughest, strongest steel used in commercial wire rope.

The Form-Set (preformed) construction means that the rope is limber, relaxed, easy to handle. Can be cut or spliced without seizing. Broken wires don't bristle. The rope is unusually well able to stand bending without premature fatigue.

Next time you buy wire rope—make it Purple Strand Form-Set. You'll be getting a combination of strength and flexibility that's hard to beat.

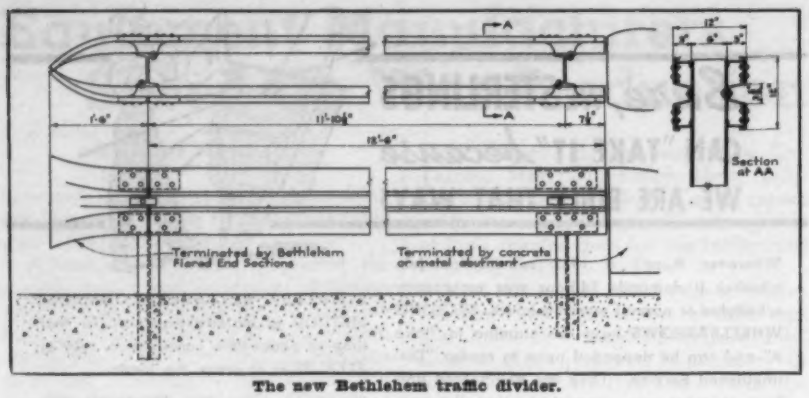
Today wire rope is the sinew of war production. For efficiency—use Purple Strand Form-Set.

PURPLE STRAND FORM-SET WIRE ROPE



BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



The new Bethlehem traffic divider.

Bethlehem Announces New Traffic Divider

A new accessory to traffic handling, designed for use particularly for narrow rights-of-way which prevent the construction of wide medial strips, and to promote safety on present highways, many of which are carrying greatly increased traffic but which can not at the present time be reconstructed, has recently been announced by the Bethlehem Steel Co., Bethlehem, Penna.

This new traffic divider consists of a heavy cold-rolled section made of 10-gage strip steel 18 inches wide before rolling and 12 inches wide after rolling into its final section, and is available in standard 12-foot 6-inch lengths or longer if desired. The wide channel construction illustrated is designed to give both high strength and positive visibility. It is stated that this divider is easy to install on any posts, although steel posts are recommended.

Full information on this new traffic divider, as well as the necessary details on the priority rating required in order to purchase them, may be secured direct from the manufacturer by referring to this item.

A. W. Herrington Heads Automotive Engineers

Announcement has been made by the Society of Automotive Engineers that A. W. Herrington, head of the Marmon-Herrington Co., Indianapolis, Ind., manufacturer of specialized automotive equipment for military and civilian services, has been elected President of the Society for the coming year. Mr. Herrington is also Chairman of the Board of the Merz Engineering Co., a Marmon-Herrington subsidiary, which manufactures precision gages, instruments and machines.

Mr. Herrington is well known in the field of automotive engineering, and has a wide acquaintance with military transport problems throughout the world gained during the first World War and since that time in frequent business trips to Europe, North Africa and the Near and Far East.

Keep Machines Clean To Keep 'Em Working

The importance of the proper care and maintenance of equipment is now greater than ever before, as the machines you have now are the machines which in all probability will have to serve you for the duration. Therefore, careful cleaning to remove dust, chips, grit, and other foreign matter which increase wear on moving parts should be a part of your regular maintenance operations.

Based on the premise that it is just as important to efficient operation to keep your equipment clean as it is to keep it properly lubricated, a new folder just issued by the Ideal Commutator Dresser Co., 1274 Park Ave., Sycamore, Ill., describes the Ideal 3-in-1 portable cleaners for cleaning all types of machines and parts.

The Ideal 3-in-1 cleaners are made in eight models for a wide variety of uses and services, and there is a comprehensive variety of suction and spraying attachments for use with these cleaners to meet practically any cleaning requirement. The cleaners may be used as a blower, as a vacuum or as a spray. When used as a blower, it delivers a powerful blast of dry air at low pressure, removing moisture from everything it touches, preventing shorts in motors, electrical wiring, etc., and preventing rust and corrosion on machine parts. Hand models are designed for working around machines and small parts, and in less accessible places, while the tank-type model is designed for larger jobs or heavier duty.

Copies of this new folder on Ideal 3-in-1 cleaners may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this magazine.

Do your share in the fight for freedom. Buy Defense Bonds and Stamps.

KINNEY DISTRIBUTORS

—already at work on vital airport jobs in the U.S.A., Cuba, Haiti, Guatemala and Brazil—

can help you with any bituminous surfacing job—and do it quickly and efficiently—write

KINNEY MANUFACTURING CO.
3531 Washington St., Boston, Mass.

POINTING THE ROAD TO EXTRA PERFORMANCE

FOR the extra performance necessary in speeding today's rush jobs, follow the Gardner-Denver way. For Gardner-Denver better design and construction give extra power and extra efficiency. That's what makes Gardner-Denver equipment first choice among so many engineers and contractors. For descriptive bulletins, write to Gardner-Denver Company, Quincy, Illinois.

● Gardner-Denver Portable Air Compressors are water-cooled for better performance wherever you put them to work. They deliver cooler air—consume less lubricating oil—deliver full air output every day in the year, regardless of altitude or weather condition.

● Gardner-Denver S-55—a perfectly balanced drill providing greatest drilling capacity consistent with easy-riding and low air consumption. Exceptional hole-cleaning ability and powerful rotation.

● Gardner-Denver UM-99 Wagon Drills are equipped for 6-foot steel changes, and are easily moved over rough ground for faster drilling. Fully adjustable for down holes, toe holes, or line drilling in almost any conceivable position.

● Gardner-Denver S-73 Sinker—67 pounds of speed and power to drill faster in harder ground. Conveniently handled in rough country—excellent holding characteristics—uses no more air than the average 55-pound drill.

GARDNER-DENVER Since 1859

GARDNER-DENVER PRODUCTS MEET SPEED V VICTORY

Cost Study Made Of Roadside Parks

Indiana Finds Wide Use Of Parks and Low Cost Per Visitor Justifies Roadside Park Program

By H. J. SCHNITZIUS, Landscape Supervisor, State Highway Commission of Indiana

✦ A CONSIDERABLE amount of abstract theory and opinion, based on general observation, has made up most public discussion of the highway roadside-park problem. Public demand created the original interest; and there being no precedent, eventual use, costs and demands were problematical. With some states showing as much as 60 per cent of their highway traffic recreational in nature, it followed that the motorists' wishes should at least be considered. After all, it was their tax money which was paying the bill.

Certain states realized the demand and its values earlier than others, and developments were put under way in response. Most of this work fell to the Landscape Engineer because of his training. Since he, in turn, had recently cut some valuable teeth on another pioneer highway problem, namely, roadside development, he tried to tread easily until he had facts on which to proceed.

While he may have been convinced of certain things himself, factual information was needed to verify his opinions and to furnish his superiors with authentic data on which they could base their determination of policy. Public support was apparent, with thousands of notes of approval to one of censure, but the same Mr. Public often forgets his summer-time pleasures when he views his winter-time tax bill. And incidentally, why do tax bills always come in winter-time?

Indiana Makes Survey

With the idea in mind of assembling facts, regardless of their effect on future programs, the Roadside Improvement Department of the Indiana State Highway Commission made a survey of Indiana roadside parks and their use in the summer of 1941. Facilities of that Department and the Highway Planning Survey were used.

Since personnel was not available to check all of the forty parks then completed, a list of fifteen, representative of different types of roads and parks, was selected. Two men made up the crew. The count was made from 10:00 a.m. to 8:00 p.m., these being the hours of general use, on one Sunday and one weekday in each park. The following information was compiled for each car stopping at each park.

Time of arrival and departure.
State of registration—Body type of vehicle.
Number each of men, women and children in each car.
Origin and destination of trip.
Remarks and reason for stop.

Use was much greater than anticipated. In some cases, as much as 5 per cent of the traffic passing the park stopped. The average, however, was about 1 per cent. Local people used the park on Saturdays and Sundays, but on weekdays the use by out-of-state cars increased. On the cross-continental roads, out-of-state cars made up 90 per cent of the totals stopping on weekdays.

Some Facts and Figures

Figures used in the recapitulation are based on use from June 1 to November 1, with 20 per cent taken off to allow for bad weather. This is conservative, as there is considerable use before and after these dates.

The average right-of-way and construction costs are accurate, and maintenance of $250.00 per park per season is estimated from 3-year figures.

Actual right-of-way and construction costs and 20-years estimated maintenance cost divided by a total 20-years use, based on present figures, reveal that it will cost $0.037 per person for his stop at the park, or $0.13 per car. Augmented future use will reduce unit cost. This is for an average stop of from 1 hour 12 minutes on Sunday to 40 minutes on Monday. For this amount, the motorist receives a safe, comfortable, shady rest area with toilets, picnic tables and stoves, fuel for stove, and water (where it can be provided). Coupled with this is often a fine view or an historical outline of some feature of the adjacent countryside.

Since the community and state derive further benefits from the traveler, it would appear that this cost is well within a reasonable figure. Some 30 per cent of the travelers stopping at Indiana

(Concluded on page 37)

The pump is always popular at roadside parks in Indiana. Here is a scene at Deep River Park on U. S. 30, one of the parks included in the study of roadside park use and costs by the State Highway Commission of Indiana.

How You Can Move Earth Faster, Same Time
Conserve Critical Materials and Manpower
use TOURNAPULLS

To get top loading efficiency from high speed scraper units use a pusher. On jobs like this defense airport, Tournapulls pusher loaded by a "Caterpillar" D8 tractor get heaping loads in 30 to 60 seconds.

Now more than ever America needs manpower . . . needs speed on the construction of war bases . . . needs critical materials—steel and more steel—for greater striking power. With Tournapulls, you can help supply all 3 needs, effectively and profitably.

More Speed, More Yardage

Because Tournapulls are quickly pusher loaded, haul at fast construction speeds (up to 14.3 m.p.h.), and spread their own loads, they move more yardage faster. Take a look at this Tournapull chart. Compare the yardages with what you get from older, conventional methods and equipment.

Haul One Way	98 H.P. Model C (11 yards heaped)		150 H.P. Super C (15 yards heaped)	
	Trips	Pay Yards	Trips	Pay Yards
600	17.1	150	15.0	180
1200	14.0	119	12.0	144
1600	12.3	104	10.7	129
2000	10.9	93	9.7	116
3000	8.4	71	7.6	91
5000	5.8	50	5.4	65

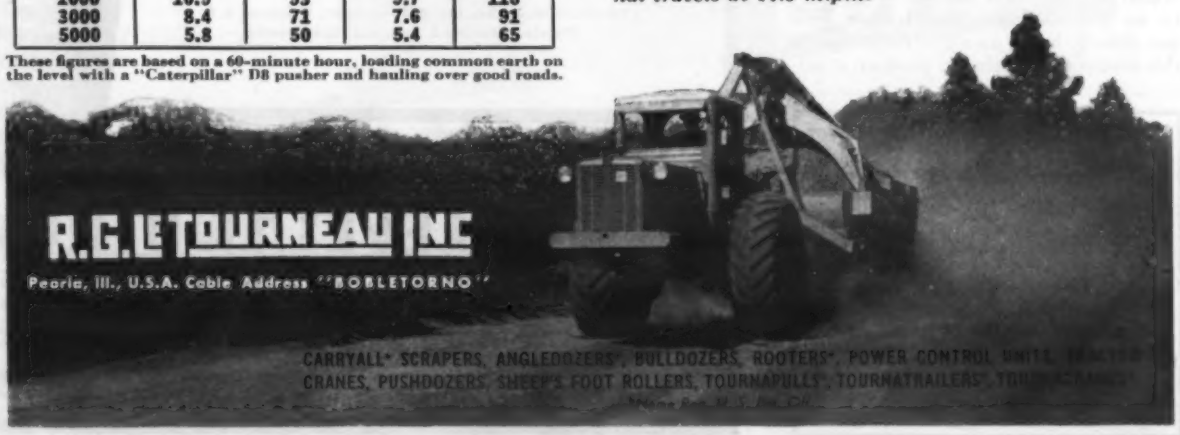
These figures are based on a 60-minute hour, loading common earth on the level with a "Caterpillar" D8 pusher and hauling over good roads.

147,000 Lbs. More Steel for Victory

As an example, take a 2000-foot haul over good construction roads. Here, because of their high average speeds, 2 Super C Tournapulls plus a "Caterpillar" D8 pusher (total weight 98,000 lbs.) will dig, haul and spread as much earth as a 2½-yd. shovel plus six 5-yd. trucks and a spreading dozer (totaling approximately 245,000 lbs.) That's a saving of 147,000 pounds of steel, vitally needed for victory. What's more, the Tournapull fleet requires 7 less men, cuts your equipment investment almost in half and reduces cost per yard approximately 54%!

Already more than 500 Model C and Super C Tournapulls are hurrying earthmoving projects here and abroad, mostly on defense. Use job-proved Tournapulls on your project to: (1) conserve manpower, (2) save steel, (3) speed defense, (4) lower costs. See your LeTourneau-"Caterpillar" distributor NOW for prices and delivery dates.

Quick loading, fast acceleration, spreading on the fly, enable you to get high average speeds over construction roads. This Tournapull working on a government arsenal travels at 14.3 m.p.h.



R. G. LeTOURNEAU INC
Peoria, Ill., U.S.A. Cable Address "BOBLETORNO"
CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*, TOURNADOZERS*

Complete Line of
DERRICKS
and
WINCHES
HASGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Preparing Runways At New Bomber Plant

(*Continued from page 2*)

grade to maximum density with the moisture held below the optimum moisture for that soil. This required the use of twenty-six double sheepsfoot rollers, a veritable army of sheeps' feet called into service to compact the vast areas. The reason for this high compaction at less than optimum moisture content was to reduce the rebound when the flexible runway base was subjected to heavy loads. In cuts, if the soil was found to be too wet, that is above optimum moisture content, it was excavated as deep as 4 feet and backfilled with material slightly below the optimum moisture content and then overpacked as described below. In all cases the sheepsfoot rollers were used to pack the subgrade to top subgrade elevation and then it was finished with pneumatic rollers and steel three-wheel rollers. In all cases particular care was taken to avoid the black soil of the lower valley in hauling in borrow for the subgrade.

When working on the subgrade and a rain occurred, which happened all too frequently during the earlier part of the contract, the subgrade was rescarified with a heavy cultivator to a depth of 2 or 3 inches which was the maximum depth of moisture penetration under any storm. The lumps were then broken up with one-way disk harrows and the whole area repacked with sheepsfoot rollers, and the pneumatic rollers and steel wheel rollers on finished subgrade. In spreading this material for rolling, a Caterpillar No. 12 power grader was used.

Selection of Aggregate

The aggregate used was the standard sand-gravel of the locality with some soil added. This soil was the top layer of the loess deposit which is a clean wind-blown material quite common in this region. The lower layers could not be used as they are polluted with sand and other materials, including some clay. The specifications for the sand and gravel grading were as follows:

	Per Cent by Weight
Passing 1-inch sieve	100 per cent
Passing No. 4 sieve	45-90 per cent
Passing No. 10 sieve	40-55 per cent
Passing No. 20 sieve	20-40 per cent
Passing No. 30 sieve	10-25 per cent
Passing No. 200 sieve	0- 2 per cent

Setting Up the Windrows

The gravel was purchased from a commercial producer for a price including delivery on the runway. The producer used a fleet of International trucks with bottom-dump bodies to deliver the material onto the sub-base, the trucks being dumped at points indicated by stakes set so as to give 1,400 pounds of aggregate per linear foot of windrow. The windrow was equalized by one of the heavy power graders, the quantity of top loess required was dumped alongside, also by stake measure, and then worked with a Seaman Pulvi-Mixer operated by the power take-off and pulled by an Allis-Chalmers farm tractor. This was done to break up all of the lumps in this material, and also to produce a uniform moisture content throughout the loess. The material was then folded into the windrow to protect it from rain.

Laboratory tests showed that the base aggregate meeting the specifications had a dry weight of 143 pounds per cubic foot. As spread in the windrows, the material was approximately 80 per cent sand-gravel and 20 per cent top loess.

For convenience in operation it was desirable to have the windrows extend the entire length of the runway so that there would be no lost time, or rather a minimum of lost time, in moving the traveling mixer from one windrow to another. As the 5,700-foot runway was cut by the construction railroad hauling material to the assembly plant, it was necessary to break the windrows so that the maximum length laid out for mixing was between 2,000 and 4,500 feet.

The Mixing Outfit

Both water and emulsion were added to the windrow by the Jaeger traveling mixer which traveled at 3½ feet per minute, working practically 24 hours a day. There were some delays due to subgrade conditions which prevented the placing of the windrows as rapidly as was desired. In general, however, the work proceeded with precision and as rapidly as could be expected when it was necessary to shift the machine from one section to another across the construction railway track. The asphalt emulsion was received in tank cars and was weighed as delivered to the 1,200-gallon tank trucks which were towed by the mixer. The original specifications called for diluting the emulsion before it was delivered to the mixer, but it was found more expedient and that better results were secured when the emulsion was diluted with 7 per cent of water during the actual mixing operation in the windrows. The added water was needed to insure complete dispersion of

(*Continued on page 50*)

CHECK OVER YOUR REPAIR NEEDS

on DAVENPORT-FRINK SNO-PLOWS

The watchword of equipment owners is MAINTENANCE. Make it last. Keep it in good condition! To the many owners of Davenport-Frink Sno-Plows we bespeak our complete cooperation in the handling of orders for repair parts. Your requirements will be promptly taken care of to insure a continuance of the SATISFACTION and ECONOMY you have been enjoying. *Write TODAY for CATALOG.*

DAVENPORT BESLER CORPORATION 2315 Rockingham Road Davenport . . . . . Iowa

Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK

A Success Story FOR CLEVELAND SINKERS

(PROVEN BY REPEAT ORDERS)

★ When a mine asks for Cleveland H111 Sinkers to be placed on test in a big shaft job, operates them four weeks against two other American made machines, then buys *six* Clevelands, and later — on two occasions — buys *still more*, that proves that Cleveland H111 Sinkers are BETTER drills. On this job the Cleveland H111 Sinkers proved their superiority because they were easy to hold; the drill runners liked the way they handled; and the management was well satisfied with the footage they turned in. ★ If you have a shaft sinking job coming up, or any other work requiring a machine in the 55-pound class, you will want to give Cleveland H111's a try-out, in your own ground, with your own operators. It's easily arranged — simply tell us where to place a machine on trial. Wet or dry—any standard chuck. Deliveries that will surprise and please.

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How to start and operate a new drill? . . . How much you gain in drilling speed by keeping your machine well oiled? . . . How to select the best lubricants for rock drills and other air tools? That lack of oil sometimes causes parts to break? What happens when the drill chuck gets excessively worn? . . . The Driller's Handbook answers these and many other questions. Sent FREE to those who write us the sizes and types of rock drills, or other air tools they use.

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BARTLETT Compound Lever BENCH SHEAR

No. 30—33" overall, 8" blades, 4½" cut. Wt. 16 lbs. Capacity 12 ga. Also 5 sizes Hand Snips 7" to 14". Your jobber can supply you.

Right- or Left-hand cut. (Rt. h. illustrated.)

BARTLETT MFG. CO.

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Outline and Bibliography For Highway Economics

Bulletin No. 78 issued by the American Road Builders' Association is devoted to an outline and bibliography for a course in highway economics, based on the report of the Committee on Highway Economics, of which Professor C. B. Breed of the Massachusetts Institute of Technology is Chairman.

Covering the broad field of highway economics, finance, taxation and administration, both the outline and the bibliography are divided into twelve major divisions under identical headings so that reference material may be found readily for the subjects listed in the outline.

Copies of this Outline and Bibliography for Course in Highway Economics may be secured by those interested direct from the American Road Builders' Association, International Building, Washington, D. C.

Trans-Isthmian Road Rushed

The construction of the Trans-Isthmian Highway to provide the first highway connection between the Atlantic and Pacific coasts of Panama is being rushed to completion, with the hope of opening the route sometime in March.

Approximately 1,000 men are now employed on this project which begins at the terminus of the Madden Dam road on the Pacific side and extends across undeveloped country to Colon on the Atlantic side.

Renewable Steel Rims for Tractor and Idler Wheels

The Alloy Steel & Metals Co., 1862 E. 55th St., Los Angeles, Calif., has recently issued a catalog on its line of alloy-manganese steel renewable rims for tractor drive sprockets and idler wheels. Where once it was necessary to replace the entire sprocket or wheel, it is now possible and entirely practical to replace only the worn portion by welding on one of these rims. They cost much less than the complete part and, according to the manufacturer, are specially adapted for resisting destructive abrasive wear. The rims are described in detail in this catalog and photographic illustrations show clearly preliminary operations of laying out, positioning and tacking in before welding.

Copies of this catalog, No. 115, (and welding instructions, if desired) may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Single-Batch Pavers

A new catalog, K 175, recently issued by Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., is devoted to its 34-E Unibatch paver. All construction features are described in considerable detail and illustrated with close-up photographs, and complete specifications are given.

Copies of this catalog may be obtained by writing direct to the manufacturer and mentioning this item.

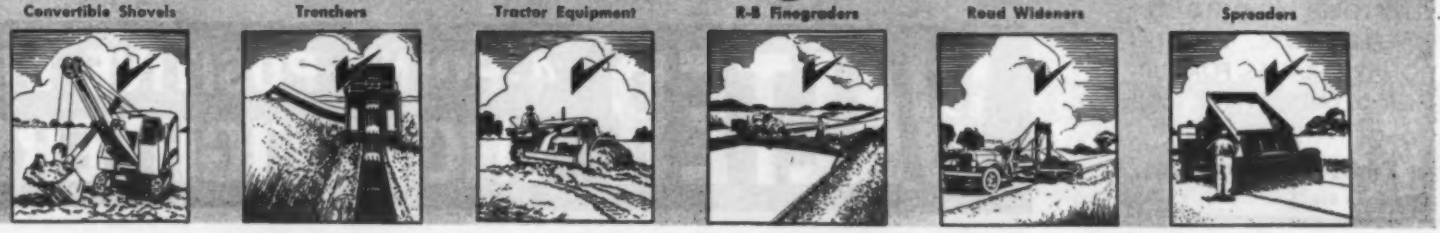
HERE'S a step by step picture of Ray Kebbe's Diesel-powered Cletrac and Buckeye Bulldozer smashing through on a highway relocation job in Michigan with 'skinner Tony Dertz at the controls.

Buckeye Bulldozers make short work of jobs like this. They're built to take a beating and they're lightning-fast with Buckeye fingertip cable control that gives you power to spare on the heavy lifts! In dirt-moving, Buckeye blades dig their own way in and *roll* the dirt ahead for bigger payloads every time. Buckeye-engineered balance means full traction behind the load and less wear and tear on the tractor. And the new Buckeye UNITILT design gives you *interchangeable* blades plus a patented tilting action that's adjusted by a twist of the wrist.

Plan now to put Buckeye 'Dozers on your machines. Ask for complete details.

THE BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Built by Buckeye



Extensive Patching Of Frost Boil Areas

Barron County Among First To Start 1941 Work Under Contract for Maintenance Of State Roads by Counties

(*Photo on page* 1)

✦ THE winter and spring of 1940-41 was unusually severe on a large mileage of black-top roads in Wisconsin where they were laid on a clay subgrade without sufficient gravel cushion to prevent frost boils. As the maintenance of state roads in Wisconsin is performed by the counties, this winter damage placed a large burden on the county highway departments. Most counties had the frost boil areas cleaned up, backfilled with gravel, and the windrows of gravel for road-mix patching in place, but the delivery of oil on state order was tardy due to the tremendous widespread demands. Barron County in northwestern Wisconsin was among the first to receive its shipments of SC-6 asphalt for this work.

Barron County has 270 miles of county trunk highways and 134 miles of state highways to maintain as well as 1,400 miles of town roads within the county, for the maintenance of which the towns frequently hire county equipment. The work of road-mixing on state roads was confined this past summer to 14 miles on Wisconsin Highway 25, which runs north and south through the county seat, the work being done under the standard equipment-rental schedule.

Preparing the Road

The sections of road which were badly broken up by frost boils were worked over with a Caterpillar No. 12 power grader, using disks or the scarifier to rip up the old oil mat. Then up to 300 cubic yards per mile of gravel was windrowed down the side of the road to furnish the required aggregate for the new road-mix mat. The road was not primed because on those sections where the new mat was being placed it was not considered necessary by state engineers. When the asphalt arrived the windrow was bladed out to the center of the road and flattened to 10 feet wide.

Shooting and Mixing

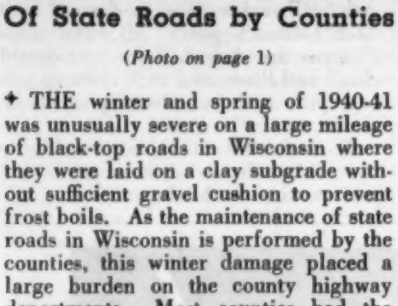
The asphalt was received in tank cars at a siding at Hillsdale just south of Barron where the county installed its Bros circulating heater to insure that the asphalt was at the proper temperature for transfer from the tank car to its 1,000-gallon Austin-Western asphalt distributor. The circulating heater worked very effectively, requiring only 4½ minutes to raise the temperature of 2,000 gallons of asphalt in the car from 100 degrees to 255 degrees, and load 1,000 gallons into the distributor. The work required applying approximately 4,000 gallons of SC-6 asphalt per mile of 22-foot roadway.

As soon as the distributor had delivered its load to the flattened windrow, one of the two Caterpillar No. 12 power graders rolled over the windrow so that traffic which used the road throughout the work would not cross the windrow and pick up the asphalt. As soon as this folding-in operation was completed, the county's new Seaman power-driven

(*Concluded on page* 40)

C. & E. M. Photo

A Bros circulating unit heating and transferring SC-6 asphalt from tank car to the 1,000-gallon Austin-Western distributor owned by Barron County, Wis.



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Gas or Electric

WE MANUFACTURE A COMPLETE LINE OF GASOLINE AND ELECTRIC CONCRETE VIBRATORS MOUNTED ON WHEELBARROW OR STATIONARY FRAMES. FOR FURTHER DETAILS, WRITE

Marvel Equipment Manufacturers, Inc.
224 So. Michigan Ave. Chicago, Ill.

—YOU MUST Keep the Roads Open!

Defense materials and parts must be trucked to keep Industry's wheels turning. Guns, troops and supplies must move swiftly to threatened points.

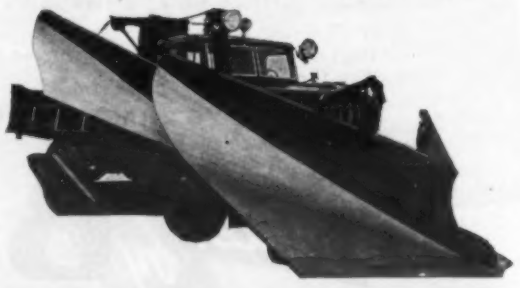
Snow-blocked highways that stop our motor transportation and bog down our motorized Army units, are costly "detours" on America's road to victory.

Clear the way with WALTER SNOW FIGHTERS! Put the tremendous power and traction of Walter 4-Point Positive Drive on the job. Get your highways open faster—clear more miles per truck —plow through the highest drifts with irresistible force.

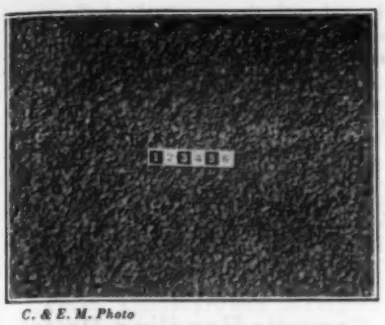
Walter 4-Point Positive Drive provides FOUR powerful driving wheels, with torque automatically proportioned to each wheel according to its traction at any instant, providing a steady, unfailing source of power.

From radiator to rear light, WALTER SNOW FIGHTERS are designed and constructed to withstand the punishing work of snow removal. Write for detailed literature explaining the features that make this unusual performance possible.

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave., Ridgewood, Queens, L. I.



WALTER 4-POINT POSITIVE DRIVE SNOW FIGHTERS



C. & E. M. Photo

The surface texture of the seal before traffic was admitted on the Gammino job in Connecticut.

Penetration Paving On Conn.-U.S. Route

(*Continued from page* 19)

self-locking lever with a bent end and chain which is used for lifting and lowering the fiber drag brooms.

After dry rolling was complete and the voids of the crushed-stone base were filled, a 1,200-gallon Mack truck with a Cummins diesel engine, equipped with a Jaeger 2-inch pump for filling the tank, was run over the section and the water released through a 10-foot spray bar with three sets of holes. This heavy sprinkling showed up voids in the sand binder, which was immediately touched up by hand during continued rolling, until the voids were filled.

This entire operation was repeated for the second 3-inch base course of ½ to 2-inch crushed trap rock.

Penetration Surface Course

Before any of the top stone was spread, a Hough rotary broom equipped with a Ford transmission for the high-speed revolution of the broom was towed by a 1½-ton truck over the entire surface to clean all sand from the top layer of the base, so as fully to expose the surface of the aggregate to create the proper key between the top stone and the base. The top stone, a uniform 2-inch crushed trap rock, was then spread in the same manner and by the same crew as had spread the two base courses. It was rolled to a thickness of 2½ inches.

The Socony asphalt was purchased from and applied by G. A. Winters, of East Providence, R.I. The asphalt subcontractor used a 2,500-gallon Etnyre pressure distributor for applying the asphalt, and a 2,800-gallon hauling truck in addition to two 1,700-gallon and four 1,200-gallon supplementary hauling trucks. With this fleet, a total of 16,000 gallons of asphalt was applied in a single day on this job, shooting 13 to 15 feet wide in two strips for the 28-foot top. At the start of an application, a wood trough 16 feet long and 2½ feet wide with a 6-inch board at the back and a 2½-inch board at the front and lined with roofing paper was used to take up the first flush of asphalt through the nozzles, to insure a clean and uniform start of the application. The paper was removed and changed as required when it became heavily coated with asphalt.

The asphalt used had a penetration of 85 to 100, and the application rate was 1.75 gallons at 77 degrees Fahrenheit, which gave an application of 2 gallons per square yard when applied at 340 degrees Fahrenheit to meet the specification requirements which gave the limiting temperatures as 325 and 360 degrees.

Immediately following the distributor, the stone crew hand-cast ¾-inch key stone over the surface at the rate of 0.027 ton per square yard. This was immediately rolled by the 12 to 14-ton 3-wheel roller; and as soon as possible thereafter, a seal of 0.75 gallon per square yard of the same asphalt was shot over the surface and covered with 0.013 ton per square yard of ½-inch seal stone. Both the key stone and the seal stone were dragged by a special frame 6 feet wide and 10 feet long with three sets of brooms at right angles to the center line of the road and two diagonal lines, one extending from the front to the mid-section of the opposite side and the second from the same point back to the other side of the frame at the rear. The contractor usually employs steel brooms in a drag frame of this type, but they could not be purchased because of a scarcity of this type of steel. The direction of travel of the drag brooms was reversed, so as to give uniform wear of the fiber brooms on both edges.

Drainage

On this job there were 22,000 feet of drain and 3,000 feet of outlet, starting from the west end of the job where, to conserve the expensive ¾-inch stone used to fill the trench which had a bottom width of 18 inches and a top width of 34 inches, the contractor set random open stone walls on both sides of the trench. This trench was cut with a Northwest ¾-yard backhoe, and was somewhat wider than specified. The 25,000 feet of drain and outlet was composed of 6-inch Armco spiral corrugated perforated asphalt-coated pipe covered with the ¾-inch stone.

Personnel

The contract for 6 miles of grading, drainage and penetration-macadam paving was awarded to M. A. Gammino Construction Co., of Providence, R. I., on its bid of $359,940.91, by the Connecticut State Highway Department. D. J. Barnett was Resident Engineer. For the contractor, J. F. Ableman was Superintendent, with John Giordano Assistant Superintendent on paving.

Your money as well as your work is needed for Victory. Buy Defense Bonds and Stamps.

How to get the highest contraction joint performance at the *lowest cost:*—
SPECIFY
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HIGHWAY
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MORE PAY DIRT PER DAY!

Bottom-Dump EUCLIDS have earned their reputation for dependable, low-cost earth and material moving the hard way . . . on the biggest and toughest jobs.

Hopper dimensions alone don't tell the whole story, because Bottom-Dump EUCLIDS are designed to both *carry* and *trail* the pay load . . . a large part of the load is utilized by the tractor for positive traction over soft fills and steep haul roads. Euclid design reduces non-productive equipment weight and results in bigger pay loads each delivery.

Successful contractors everywhere favor Bottom-Dump EUCLIDS because of their trouble-free performance and extra capacity. Ask anyone who uses them and he'll probably say, "I think Euclids are the finest hauling units you can buy."

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID
SELF-POWERED HAULING EQUIPMENT
For EARTH . . ROCK . . COAL . . ORE
CRAWLER WAGONS · ROTARY SCRAPERS · TAMPING ROLLERS

Soil-Cement Highway Base Is Plant-Mixed

(*Continued from page 2*)

with a slope of 1½ to 1.

On the 84-foot section of the road bed, a single 23-foot lane of similar construction was laid under this contract. Eventually another lane will be added to this section, with a dividing strip 20 feet wide.

Grading

Work was started on February 5, 1941, with the grading of the roadbed. Adobe soil, which existed on considerable portions of the route, was removed and the entire roadbed covered with 1½ feet of selected material brought in by trucks which were loaded by power shovels. This subgrade was then compacted by sheepsfoot rollers to a relative compaction of not less than 90 per cent.

On the southern 3 miles, where the road runs across the end of Newport Bay and through rolling hills, a large amount of cut and fill was necessary. Carryalls and power shovels loading to trucks were used for this. Fills were put down in 8-inch layers and compacted in the usual manner. The entire job involved the excavation of 230,000 yards of material and 18,000,000 station-yards overhaul.

Soil-Cement Work

In constructing soil-cement roads, various methods have been employed, such as windrowing the soil and mixing it in place with a traveling pugmill, or by simply dumping cement on the prepared roadbed and mixing it by disks. On this job an entirely different method was used.

About halfway along the road a Standard Steel Corp. pugmill-type mixer with a capacity of 4,000 pounds was set up and this unit batched and mixed all the material which went into the stabilized base.

All soil came from a borrow pit located about a mile from the mixer and was loaded by shovel into trucks. At the plant it was dumped through a grated ramp into a hopper, from which it was conveyed by belt to the automatic batcher. Bulk cement was imported in tank trucks from the Riverside Portland Cement Co., a haul of about 60 miles, and conveyed from storage bins up to the mixer. The cement portion of the mix was 7 per cent by weight.

Spreading and Rolling

From the mixer the batch was taken by truck to the soil-cement spreader and dumped directly in front of the strike-off which was elevated to spread the mix to the desired thickness. Besides the operator of the tractor which pushed the spreader, two men with shovels were required to keep the mix pushed down so that it would feed evenly. The tractor was equipped with teeth behind the crawlers to loosen the soil-cement mix which was prematurely compacted by the crawlers.

Closely following the spreader came a 12-ton 3-wheel Buffalo-Springfield steel roller which made as many trips over 40 to 50 feet of newly spread mix as possible before another similar length was spread. A relative compaction of not less than 95 per cent was required.

After the steel roller had passed, the surface was trimmed with a motor patrol to remove irregularities, following which it was rolled by a pneumatic-tired roller. The surface was then sprayed with a seal coat of penetrating asphalt emulsion at the rate of ⅛ gallon per square yard. Seven days were allowed for curing, during which time no construction traffic was permitted on it.

Progress on the soil-cement base was at the rate of about 1,000 feet of 25-foot width per day, and about 30,000 yards of the soil-cement mix were required for the entire stabilized base.

Placing the Black-Top

The 3-inch asphalt black-top surface is a plant mix and was laid in two courses, using SC-5 liquid asphalt in the level course and SC-6 in the top. A spreader box and motor patrols were used on the level course and the surface course was spread with a Barber-Greene asphalt spreader. A 10-ton Buffalo-Springfield tandem roller was used for compaction.

Equipment

The major equipment used by the contractor on this job included: six RD8 tractors, four LeTourneau 12-yard Carryalls, one Koehring 1¾-yard shovel, one Lorain 2-yard shovel, one Lima 2-yard shovel, one Koehring dragline, fifteen 5-yard and eleven 7-yard International trucks, one Buffalo-Springfield 12-ton 3-wheel roller and two B-S 10-ton tandem rollers, two 8-foot sheepsfoot rollers, two 1,000-gallon water tank trucks, one soil-cement spreader, one Barber-Greene asphalt spreader, three Caterpillar No. 12 motor patrols, one seal-coat sprayer truck, two Gardner mixers, one Standard Steel Corp. 4,000-pound mixing plant, and 6½ miles of 4-inch water pipe.

Personnel

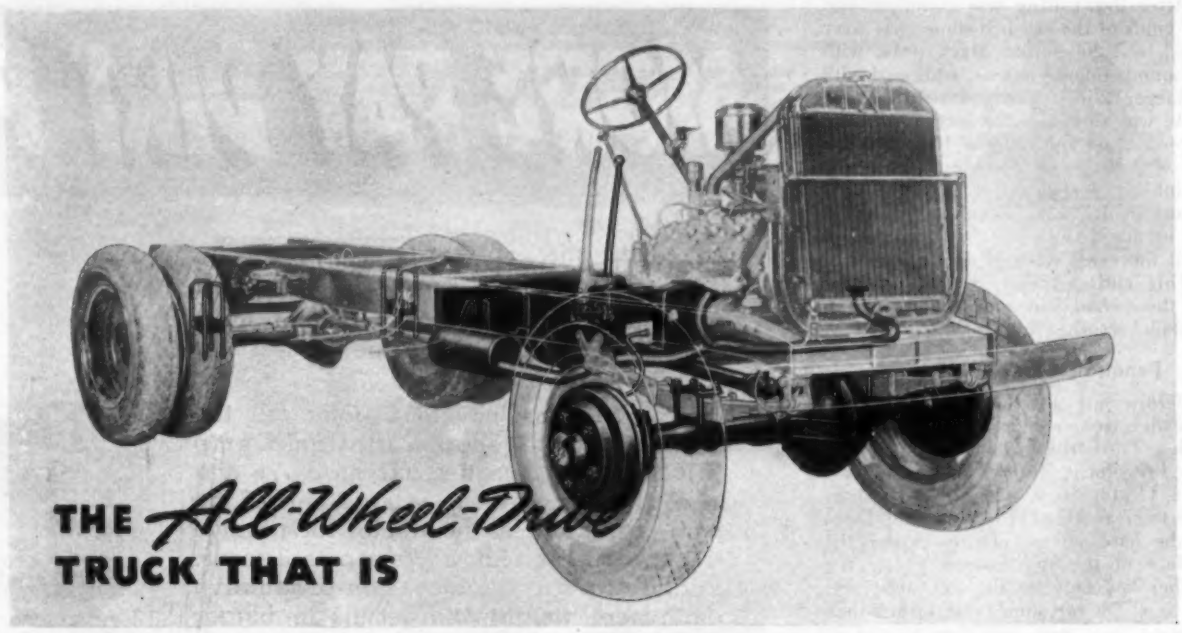
Although some delays were experienced with the approach of the rainy season, the work on this contract went through on schedule, and the job was completed on January 15, 1942. An average of 75 men were employed in the various phases of the work.

The contractor was the Mittry Bros. Construction Co., of Los Angeles, Calif., for whom D. L. Ross was Superintendent. For the California Division of Highways, W. D. Eaton was Resident Engineer.

Concrete-Handling Units

The Gar-Bro line of concrete and material-handling equipment, including Gar-Bro concrete buckets, portable concrete hoppers, concrete carts, wheelbarrows, and similar equipment, many units of which are now playing their part on defense construction jobs, is described and illustrated in literature issued by Garlinghouse Bros., 2416 E. 16th St., Los Angeles, Calif.

Copies of these catalogs may be secured direct from that company.



THE *All-Wheel-Drive* TRUCK THAT IS

Revolutionizing Transportation

Transportation will never be the same after this war is over. Operators in road building and maintenance, snow-removal, in the oil fields, public utility services, and scores of other difficult jobs, on and off the highway, will never be content to put up with less efficient trucks, after observing the performance of *All-Wheel-Drive* vehicles in military operations.

All-Wheel-Drive really *does things* that no conventional drive vehicle can do. It *goes places,* over desert, plain and field where no other vehicle can go. Neither hub-deep mud, sand, dirt or snow can stop it. "Impossible" hills and grades level out like magic. Get the facts about Marmon-Herrington *All-Wheel-Drive* converted Fords now. Write for literature.

MARMON-HERRINGTON CO., INC., INDIANAPOLIS, INDIANA
Cable Address MARTON

Marmon-Herrington *All-Wheel-Drive* converted Ford hole-digger and utility line servicing truck.

Marmon-Herrington *All-Wheel-Drive* converted Ford hauling oil line pipe in South America.

MARMON-HERRINGTON *All-Wheel-Drive*

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La Crosse Makes Them Up To 200 Ton Capacity

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LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

The Jackson hydraulic vibrator.

Hydraulic Vibrator Has Improved Frame

The feature of the improved Jackson hydraulic concrete vibrator, recently announced by Electric Tamper & Equipment Co., Ludington, Mich., is the new wheelbarrow frame of welded tubular steel. Its overall dimensions are less than the old cast malleable iron frame, and it is lighter in weight. The wheel is demountable, the legs are cushioned, and the new-type wheelbarrow handles are easily pushed down to the ground or floor to clear hose lines or other obstructions.

This vibrator is of the adjustable-frequency 4,000 to 7,000-vpm type, with a displacement-type hyraulic motor, interchangeable Nitraloy parts, super-speed ball-bearings, automatic pressure lubrication, seamless steel casing, alloy steel spade point, and is 2¾ inches in diameter x 21 inches long overall. Since it is furnished as a two-piece screw joint casing, a quick change may be made to a 1¾-inch x 36-inch vibrating head or to a grinding and boring head. The head is also furnished in the 2¾-inch diameter size with a one-piece casing.

Power is furnished by a 4.7-hp single-cylinder engine, the features of which are forced draft, air cooling, roller-bearing crankshaft, fully enclosed ball-bearing flyball governor, high-tension magneto impulse starter coupling, oil-bath air cleaner and idling attachment. The hose equipment includes a total of 34 feet of hose, consisting of 17 feet of single 2-inch diameter flexible handle and 17 feet of double hose line of three cord plies and with a Neoprene oil-resistant lining and abrasion-resistant rubber casing.

A new bulletin on the improved Jackson hydraulic vibrator may be secured by those interested direct from the manufacturer by mentioning this item.

Small Electric Motors Described in New Folder

Small motors from 1/6 to ½ hp, 145 frame size, for general use are described in a new 8-page folder recently issued by Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna. The standard parts, making available more than 5,000 combinations of type, rating, and mounting, according to the manufacturer, are described and illustrated. Charts show motor characteristics, plotting per cent synchronous speed against per cent full load torque. Features conducive to long motor life and low maintenance are discussed along with construction details. Blackline drawings give the necessary physical and mounting dimensions.

A copy of Folder F-8623 may be secured direct from the manufacturer, Dept. 7-N-20, by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 26 Years
ECONOMICAL and EFFICIENT
Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

The Highway Outlook

(*Continued from page 4*)

tinued, particularly investigations and studies required for the detailed planning of a backlog of post-war construction projects. This planning will serve the double purpose of providing for the early completion of improvements deferred during the war and of supplying employment for labor displaced by the war effort.

Of great importance among such deferred improvements will be those designed to relieve congestion and supply terminal and off-street parking facilities in cities and metropolitan areas. Such improvements are already urgently needed. The cataloging of such desirable post-war construction is one of the purposes of the Public Work Reserve. The Reserve was set up also to encourage specific advance budgetary and planning provisions for such work by state and local governments.

In the field of highway improvement, we are fortunate to have specific provision for substantial Federal Aid to such advance planning by state highway departments. The Defense Highway Act of 1941 authorized an appropriation of $10,000,000 for this planning work. This sum, under the law, is to be apportioned in the same manner as other Federal highway aid, among all states, the District of Columbia, Hawaii, and Puerto Rico. It must be matched on the usual 50-50 basis with state funds.

Passmore Appointed Mgr. Of Worthington Plant

The appointment of George P. Passmore as Works Manager in charge of manufacturing at its Wellsville, N. Y., plant has recently been announced by Worthington Pump & Machinery Corp., Harrison, N. J. For the past 20 years Mr. Passmore has been associated with the Westinghouse Electric & Mfg. Co. in various responsible capacities, and in May, 1941, was awarded the Westinghouse Award of Merit.

Hobart Arc Welding
with Exclusive Remote Control for Faster Construction!
Remote Control, especially valuable on construction jobs, eliminates usual delays and actually speeds up work. Preserves weld quality, too. With Hobart Gasoline Drive Portable Arc Welders you can weld continuously without fear of overheating or blowouts. Easy to control, operates efficiently anywhere. Banishes costly delays by repairing equipment right on the job. Write for details.
New, concise and easy to understand WELDING MANUAL. Just off the press. 316 pages, hundreds of illustrations. Send check now for this valuable book or have us send COD. $2.00 Postpaid only
Hobart Bros. Box CE 22 Troy, Ohio
"One of the World's Largest Builders of Arc Welders"

BEST ON A WIDE VARIETY OF JOBS
"During the many years I have owned A-W BADGERS, I have excavated a number of railroad subways between pile bents where full revolving shovels could not have been used . . . excavated narrow alleys just barely wide enough to take the crawler tread on the machine . . . erected structural steel beams for bridge floors that were much heavier than could be handled by any other type of machine. In fact, the A-W BADGER is the most versatile and most satisfactory machine I have ever owned."

BUILDING UP OUTPUT RECORDS

WHERE NO OTHER SHOVEL COULD GO

• Because the half-yard BADGER swings less dead weight to move more dirt, it rivals larger shovels in output capacity. An exceptionally low center of gravity and a single line pull on the hoist drum of 10,000 lbs., together with a positive, powerful chain crowd give the BADGER the power and stability to handle any diggable material with maximum speed.

This rugged, big capacity, fast-moving shovel is exceptionally economical to operate because it wastes no fuel or power swinging unproductive weight. It performs with equal efficiency as a shovel, dragline, trench hoe, pile driver or skimmer. Investigate its record of efficiency and economy on a wide variety of jobs.

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

BE READY WITH AN Austin-Western BADGER

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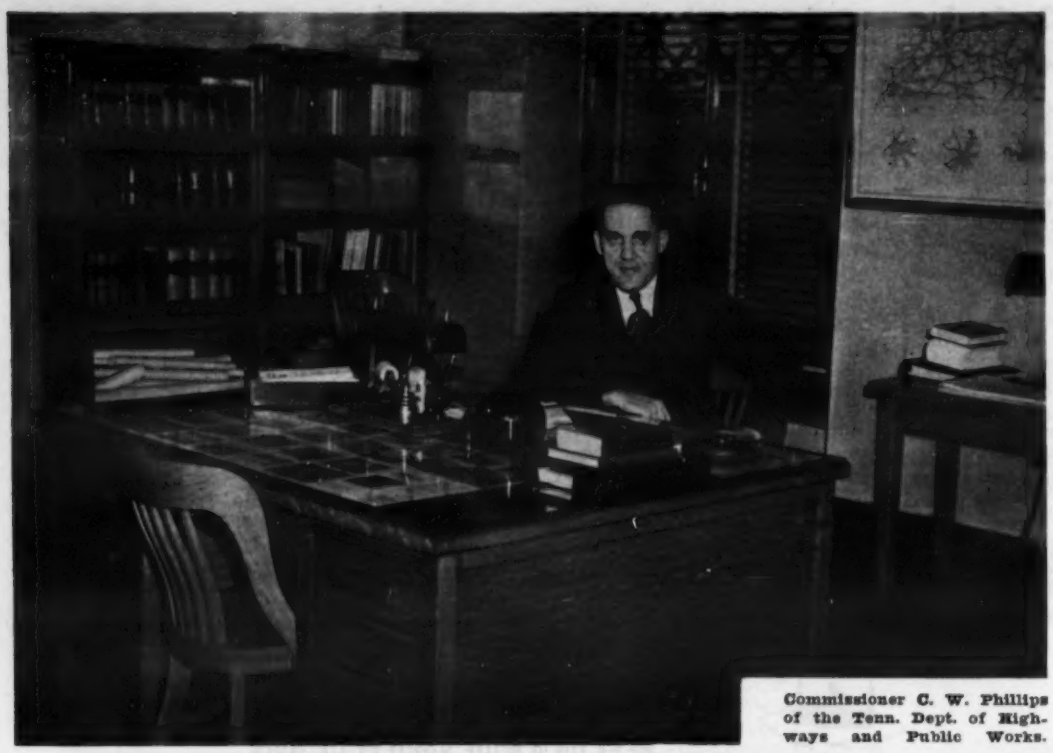
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • BUMP CARS • TRAIL CARS

Tennessee

A Pictorial Story of Some of t of the Tennessee Departme



Commissioner C. W. Phillips of the Tenn. Dept. of Highways and Public Works.

O. F. Goetz, State Construction Engineer for Tennessee.

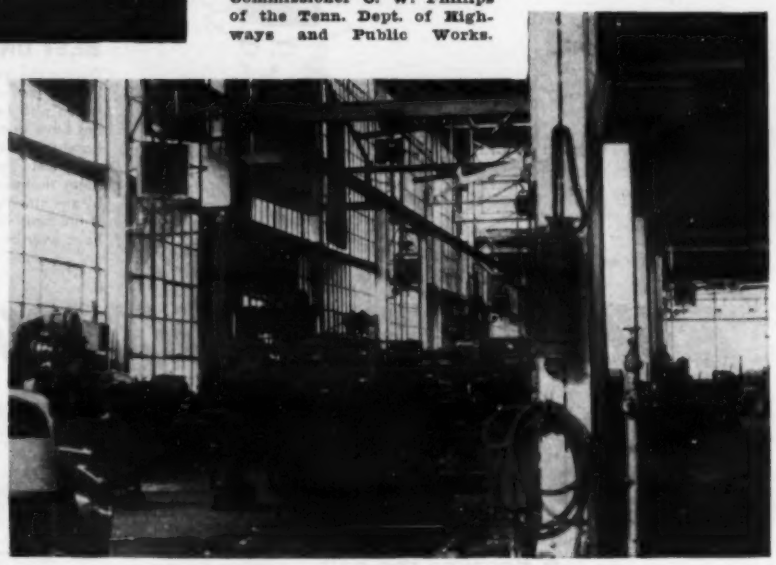
RELOCATION. Above, construction under way on a concrete overpass near Memphis, where the A. R. B. A. Defense Highway Congress will meet Mar. 2-4.

●

Right, an improved location showing the old road, the new concrete highway, flat shoulders and slopes in middle Tennessee.

●

Below, grading operations on a road section reconstructed because of TVA dam construction in eastern Tennessee.



REPAIR SHOP. Interior of the equipment repair shop at the Knoxville Division Garage, showing the convenient arrangement of machines.

CORDELL HULL. Br... tha... fo... Tennessee and one of the we...

OLD AND NEW. A five-span concrete bridge replaces an old two-span structure in eastern Tennessee where TVA construction has made considerable highway relocation necessary.

ROADSIDE ... between Monte...

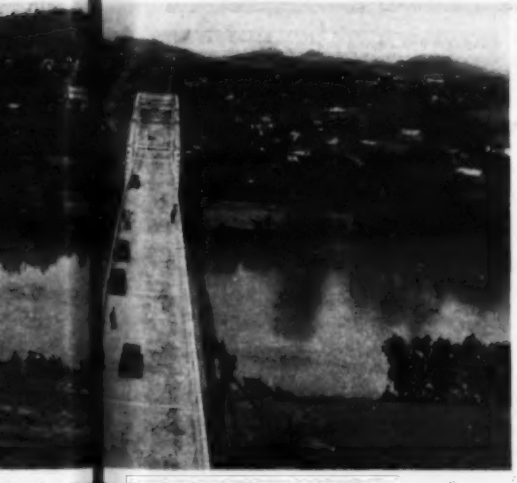
Highways

e of tctivities and Accomplishments
rtme Highways and Public Works

Briggs Smith, Engineer in Charge of Maintenance.

J. W. Gentry, State Highway Engineer, at his desk in the War Memorial Building.

UNDERPASS. A simple plate-girder structure with ample clearance, carrying the railroad line over a highway near Nashville.



ULL. Br e Cumberland River near Car- th for Cordell Hull, a native son of of the wo ding statesmen and diplomats.

SAFETY. Above, the highway between Cookeville and Sparta made non-skid by bituminous surface treatment and seal on a water-bound macadam base.

●

Left, placing a permanent center line of iron oxide in a new concrete pavement through rolling country.

●

Below, good sight distances on approaches to a new bridge in middle Tennessee add safety to highway travel.

ADSIDE shoulders flank- ncrete pavement een Monte nchester, Tenn.

MEDIAL STRIP. This four-lane dual highway with medial strip, curb, gutter, and sidewalk near Alcoa is an example of modern state highway construction within an urban area.

Increased Demands On Highway System

(*Continued from page 8*)

The outlook, therefore, is for the deferment of considerable road and street construction. This emphasizes the importance of adequate maintenance of existing highway facilities. Maintenance operations must be adequately financed and supplied.

Clear the Decks for Action

By G. DONALD KENNEDY, President, American Association of State Highway Officials

It is useless and short-sighted for highway administrators to think in any other terms than war transportation. Highway programs in all their aspects, whether it be construction, maintenance, research, or finance, must have war significance. Normal programs are out of the question.

Our job is to provide the highway facilities for the rolling equipment of the Army and Navy and especially for the transportation of the vital materials which at an ever-increasing rate must be poured into our factories and mills.

Like the Army and Navy, we must clear our decks for swift action to provide the transportation which is absolutely vital to a successful war effort.

Increased Demands on Highways

By HAL G. SOURS, President, American Road Builders' Association

In my judgment it is imperative in our national defense program that the motor transportation system function as efficiently as possible. The enormous increase of tonnage now being hauled over our highways to supply defense industries is severely damaging, and in many cases is breaking up old sections of trunk-line routes. In addition to this, the location of new industrial plants and military and naval establishments have created problems which can not be handled with existing highways.

It is essential, therefore, more than ever, that proper highway maintenance and construction, particularly reconstruction, be carried on without interruption and, in fact, speeded up as much as possible.

It is obvious that many desirable improvements must be postponed in order that our efforts may be concentrated on highways of defense importance. It is also true that many badly needed improvements on highways carrying heavy traffic will not be approved as defense projects. As a result of this, the states will be called upon to finance some such projects without Federal Aid. Consequently the importance of adequate Federal appropriations for defense highways becomes more apparent.

There will be a rearrangement of the normal programs but the abnormal demands increase rather than decrease the overall needs. Experience in some of the foreign countries has proved beyond a doubt the vital necessity of keeping our motor transportation system and its facilities in good order.

No Slackened Pace

By CHRIS J. SHERLOCK, President-Nominee, American Road Builders' Association

Victory is now the end toward which every effort of American life is concentrated. Until the enemy is decisively and unconditionally defeated, there can be no thought of "business as usual." The highway departments of the forty-eight states have thrown into the discard plans for highway construction where such construction is not deemed essential to national defense. The highway user, whose gasoline taxes and registration fees have made possible the vast network of national, state and local highways, is prepared to forego improvements on roads that are not vital to the war effort.

This suspension of non-defense activity does not mean, however, that the highway industry and profession can slacken its production or slow its pace. On the contrary, road builders must work harder and faster than ever to answer defense demands. For roads are as necessary a part of national defense as guns and ammunition. As suggested by President Roosevelt a year ago, "particular attention must be paid to the strength of bridges, the width of strategic roads, adequacy of ingress to and egress from urban centers and the servicing of existing and proposed Army, Naval and air bases." These are the roads to which available man power, machinery, materials and money must be devoted.

As with all defense activity, responsibility for financing these projects rests with the Federal government. The states will, of course, cooperate by earmarking their own highway funds for improvements of strategic military importance and for maintenance of strategically significant roadways, but the principal burden for new construction must be borne by the national government.

All road-builder energies and resources must be drafted to eliminate the road and bridge inefficiencies which bottleneck defense. Adequate standards must be achieved and maintained on the roads that link centers of population and industry, that connect the vast agricultural interior with the strategic districts. On the successful promulgation of this program depends the ability of America to arm and feed its soldiers and civilians from now until the war is won.

Labor Still Available

By M. W. WATSON, President, Associated General Contractors' of America

While our primary purpose at this time is for an all-out production and organization of the country for the winning of the war—and with that undertaking I am 100 per cent in accord—unquestionably an adequate system of highways is a fundamental part of our war effort. We must necessarily be guided by the knowledge of our military authorities as to which functions of our governmental and industrial affairs are the most essential for winning the war, but careful consideration should be given to all the needs of our country in order to preserve not only the military but the civil morale as well.

Necessarily in the conversion of our industrial efforts from peacetime to wartime, many readjustments will be necessary and time will be required before all possible industry and labor can be fitted into the picture of our war effort. During this readjustment we feel that there will still be available, in many parts of the country, organizations, equipment and personnel for the continuation of a substantial amount of road construction, especially in areas where there is little or no war industry. By proper coordination between our highway officials and the military officials, much of this work can be conducted by redesigning the types of work so as to involve as little as possible of the critical materials.

According to statistics published by O.P.M. in their bulletin entitled *Victory*, we still have 3,900,000 unemployed people in this country, which exceeds

(*Concluded on next page*)

Rex Speed Prime Pump on overpass job.

Stepping up and maintaining work schedules during these days of high pressure production in all lines, requires equipment of maximum dependability and efficiency.

Because Wisconsin Engines (1 to 35 hp.) are built for *heavy-duty service; because they are air-cooled;* because they are compact in design; extremely light in weight; equipped with weather-sealed outside magneto with impulse coupling for quick starting in any weather; because they run on Timken roller bearings... Wisconsin Engines AT WORK today, are increasing productive capacity wherever they are in use.

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Both External types for forms and Internal types for mass. Both electric and gas-engine driven.

ENGINE GENERATOR SETS

Make your own electricity. For operating tools and lights—right out on the job—1-1½-2-3-5-6 K. V. A. Sizes.

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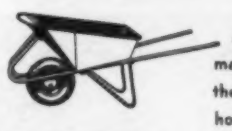
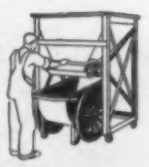
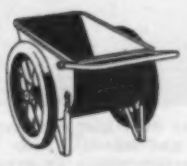
GAR-BRO for *Defense!*





A WORLD'S RECORD of twenty-four completed ammunition storage magazines in 24 hours was recently set by J. A. Terteling and Sons at the Umatilla Ordnance Depot near Hermiston, Oregon. Above is shown how this igloo pouring was done—with *GAR-BRO* equipment! Each *GAR-BRO* product has been scientifically designed with a particular job in mind. Every product will, therefore, do its job the easiest, best and fastest way—the *GAR-BRO* way. For material handling and concrete placing equipment catalogs write Garlinghouse Brothers, 2416 East 16th St., Los Angeles.



GAR-BRO
Construction and Industrial Equipment

Road Builders Will "Keep 'Em Rolling"

(*Continued from preceding page*)

the total number they show as engaged in the defense industries. With the closing down of many small industries, due to their inability to secure critical raw materials, we can not but anticipate an increase in unemployment until such time as they can be absorbed in war work. It is apparent that as of this date there is not yet such a shortage of labor as to require the total discontinuance of highway construction. Highway departments and other public officials engaging in road work should measure the need for any particular project as it relates to strategic or access highway systems, and as far as possible devote their construction efforts to the completion of those systems.

Our Front Line—California

By C. H. PURCELL, State Highway Engineer, California Division of Highways

Conditions in California, because of the state's geographical position in the front line of defense and because it has been declared a combat area for naval and military operations, probably differ from those in a majority of the states. Traffic increases on California highways are climbing to greater volumes than ever anticipated as a result of the influx of large military contingents with consequent troop movements within the state. In addition to the distinctly military and related traffic, the tremendous expansion of defense industries within California has resulted in most serious traffic congestion in the many areas adjacent to such industrial establishments.

These conditions make imperative both construction and maintenance of California highways designated by military authorities as essential to national defense so that it appears the work of the Department must proceed at an increased tempo for some time to come.

At the present time, the California Division of Highways has completed surveys for military access-road projects within the state, recommended by military and naval authorities and the Public Roads Administration, the construction of which has been estimated to cost more than $40,000,000. Plans and specifications have been completed on about $25,000,000 worth of these projects so that actual construction may be started immediately with apportionment of Federal access funds and clearance of right-of-way. Surveys on additional access projects are now in progress and further work on plans and specifications is rapidly advancing.

In California there are approximately 5,900 miles of road designated by the War Department as being on the strategic network. In preparation for actual combat operations on the Pacific slope, much of this strategic mileage must undergo radical improvement if it is to serve the needs of the military on the move. Surface and bridge weaknesses, together with inadequate widths and shoulder deficiencies, which require immediate reconstruction are of such magnitude as to tax the resources of our entire state highway organization if these highway facilities are to be of value to the armed forces and their heavy motored equipment.

There seems little doubt but that, during the entire war period, construction and maintenance activities on defense highways in California will be a major program.

There also can be little doubt but that this defense highway effort will result in the side-tracking of many normal highway activities. Priority allocations will undoubtedly limit construction to access roads and to the strategic network, and the great volume of work to be accomplished on these defense highways must be done with curtailed forces as the inroad into highway personnel by the Army and Navy is already being felt. Some of the normal highway construction practices will of necessity be pushed aside in the effort for speed in the work and while laboratory and inspection standards must be held wherever possible, they can not be expected to be held to the rigid values which have obtained under peacetime construction.

The overloads on pavements, surfaces, and bridges resulting from wartime traffic conditions will undoubtedly cause a serious lack of sufficient finances for adequate construction and maintenance during the entire war period.

Road Services Are Many

We have just seen in California an interesting example, within the borders of one state, of the many varied and vital services which our highway system will be called upon to perform in the war effort. Transportation service, greater and more efficient than ever before, is the job facing highway engineers and road builders today. The slogan "Keep 'em rolling" applies to the highway industry as much as to the production line.

To do this job, in the face of curtailed highway funds, material shortages, loss of trained personnel who are called for military service, and the need for speed, places a burden on road builders and engineers, and will tax their ingenuity and resourcefulness to the full. But this is the great service which the highway industry can render and, based on its past splendid performance, this is the contribution which the highway industry *will* make to Victory.

The Warning Lantern
. . . with the
SAFETY BEAM

EMBURY
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An ever-watchful sentinel for the streets and highways of today. Strong. Leakproof. Storm-tested. Ruby Fresnal safety lens magnifies the flame to beacon size. Pint of oil lasts for 3 days and nights. Base is non-tipping. Choose Traffic-Gard for better protection at lower cost.

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★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

CONSTRUCTION VOLUME ESTIMATE, TEN BILLIONS

↑ MORE FOOTAGE per drilling dollar—that's why contractors prefer CP-42 Sinkers. Designed particularly for fast drilling in all formations, excavations, road work, shaft sinking. Low air consumption makes it ideal for use with portable compressors.

CP CONTRACTORS' DIVISION EXPANDS FOR GREATER SERVICE

Added Personnel, New Products

NEW YORK—Immediately after Pearl Harbor, 1942 construction volume estimates were stepped up to ten billion dollars. Future appropriations may bring the total to record proportions. To aid the industry to meet this huge program, Chicago Pneumatic has further expanded its Contractors' Division. New personnel has been added to the home office and district branches to counsel with contractors in the preparation of bids and selection of time-saving equipment. Improved compressors, advanced models of rock drills, time-saving pneumatic tools, and other specialized equipment are on the Chicago Pneumatic production lines and are rapidly being made available to the construction industry.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York, N. Y.

↑ "THE BEST ENGINEERED, simplest and most efficient portables I have ever seen," a well-known chief engineer said of the CP Portable Compressors. New refinements of design and construction, with the well-known Chicago Pneumatic dependability, economy and low maintenance.

↑ FOUR-WAY ADJUSTABLE tilting tower, permitting quick, easy adjustment through 25° either side of vertical; 7½° lateral adjustment to facilitate drilling of angle holes and bring tower to vertical on uneven ground; adjustable rear wheels—just a few advantages of the new G-500 Wagon Drill.

312,000 CUBIC YARDS→ of mass concrete placed on one large dam job with four CP-518 Vibrators, at a cost for repair parts of only 1.7 mills per cubic yard! Low maintenance costs characterize all seven models of CP Pneumatic and Electric Vibrators.

↑ NOTHING FASTER than a CP-365 Pneumatic Wrench (impact type) for running nuts off or on. Handles nuts, studs, bolts, etc., up to 1¼" bolt size. Four other models for nuts from ⅜" to 1¾" bolt size. All have powerful rotary motors and gearless spring drives—insuring low maintenance costs.

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CONTRACTORS' EQUIPMENT

Air Compressors, Rock Drills, Pneumatic Tools, Vibrators, Pumps, Electric Tools, Diesel Engines

Repairing Highways Following Air Raids

New York's Governor Puts Into Operation a Mutual Aid Plan to Expedite Debris Clearance and Repair of Essential Highways

✦ THE war experience of England is the basis of a mutual aid plan for highway repair and debris clearance which Herbert H. Lehman, Governor of the State of New York, has put into operation. The plan was prepared by a committee of state and municipal engineers created by the New York State Conference of Mayors and the State Department of Public Works. Edward T. Gawkins, Assistant State Highway Commissioner, has been appointed State Coordinator.

The report is divided into three parts: (1) summary of the plan; (2) legislation suggested as necessary to carry out the plan; and (3) the method of operating.

The Plan

The state is divided into eleven highway and debris clearance zones, ten of which are coextensive with the present ten state highway districts and the other is New York City. The State Coordinator, appointed by the Governor, is responsible to him and is in complete charge of the direction, integration and coordination of the works in the eleven zones. The plan, as drawn up, specifies that the State Coordinator be a member of the staff of the State Department of Public Works.

There are ten Zone Coordinators of highway repair and debris clearance for the ten state highway districts, these being the district highway engineers, and in New York City the Zone Coordinator is to be appointed by the Mayor. The county superintendents of highways and officials responsible for street construction and maintenance in the cities are to be designated by the mayors as assistant coordinators in each zone.

The duties of the coordinators consist of the preparation of an inventory of the highway and maintenance personnel, equipment and supplies available, and the determination of the availability of each in his zone. This information is to be distributed to the public works and highway officials in the zone, and based on this, a zone plan is being developed in conjunction with all units of government in the zone for the use of all of these resources in an emergency.

When a request is made to a Zone Coordinator by any unit of government in his zone for personnel, equipment, or supplies, the Zone Coordinator is empowered to put the zone plan into operation to the extent requested and to make all needed items available. Interzone requests for aid are to be made to the State Coordinator and after investigation he is empowered to make the necessary items available from any zone.

Legislation Required

Certain legislation is required and will be passed shortly in order to expedite the operation of the plan as follows:

(1) Municipalities and other units of government will be empowered to rent or loan equipment and supplies to other units of government, with the borrowing unit of government being liable for any damage to or loss of equipment and for the cost of supplies.

(2) Municipalities and other units of government will be empowered to loan personnel, the borrowing unit of government to pay salaries or wages, transportation and necessary expenses and to be liable for workmen's compensation or to reimburse the loaning unit for these expenditures.

Method of Operation

Soon after air raids began in England, it was found necessary to provide a central pool of equipment and personnel that would be available on short notice for work in any stricken area. The state district highway forces in New York are distributed throughout the district but have centrally located headquarters with garages, repair shops, etc., which will operate as the equipment and personnel pool and be available almost immediately. This was the procedure in 1938, when many communities on Long Island were wrecked by the hurricane.

The county, town, city and village forces, although also almost immediately available, would operate as a second line or reserve, except in the areas where the emergency existed. The exact disposition and use of the state, county, town, city, village and private equipment and personnel will of course depend on the circumstances and resources of the district, the specific plan formulated in the district to meet the emergency, and the extent of the emergency.

The plan, as completed for any district, will provide an orderly and quick procedure for the full utilization of whatever units of the extensive highway maintenance resources which would be needed, based on the extent and seriousness of the emergency.

The committee which drew up the plan and presented it to Governor Lehman for acceptance consisted of: J. W. Holler and Elmer Lawton, District Engineers, State Department of Public Works; Joseph Shaw, City Engineer, Utica; Fred K. Wing, City Engineer, Buffalo; F. Ray Williams, County Engineer, Saratoga Springs; Arthur Boniface, Village Engineer, Scarsdale; Charles H. Sells, Superintendent of Public Works, Westchester County, White Plains; Fred Miller, Town Superintendent of the Town of Pittsford, Monroe County; and Edward T. Gawkins, Assistant Commissioner, State Department of Public Works, as Chairman.

Want information? Write the Editor.

NEW!
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portable
CONCRETE RODDING
MACHINE
Whiteman Precision Cement Floor Finishing Machine, gasoline model with a 2.5 AB Wisconsin Air-Cooled Engine, net weight 197 lbs.
Equipped with Wisconsin 2.5 Air-Cooled Gasoline Engine, weight 227 lbs.

One of the hardest and most difficult operations in the laying of concrete floors, and one that has always been looked upon more or less with disdain, is rodding. For years men associated with concrete have desired that someone might develop an idea which would result in the elimination of this backbreaking operation.

After many months of research and experimenting to produce this much-needed piece of equipment, the Whiteman Manufacturing Company has finally developed a portable concrete rodding machine which has been given thorough and complete tests on some of the largest jobs in Southern California.

When you stop to consider that the average pour—which will enable your men to rod without too much difficulty—is from a four to six inch slump, you will readily visualize the advantages of a machine that will enable you to handle concrete of a 1½ inch slump. The Whiteman Portable Concrete Rodding Machine will rod your floors accurately, using for screeds the standard screeds that you would ordinarily use if you were rodding by hand. Not only will it rod your floors to a perfect level, but at the same time the action puddles and condenses your concrete into a solid mass through the entire depth and over the whole area, bringing the moisture to the surface, preparatory to using the Whiteman Precision Cement Floor Finishing Machine. You can now have that low-slump concrete that builders and architects have so long desired, at even less cost than the obsolete method of hand-rodding your concrete.

Today is an era of speed, and in order to cope with advancing conditions, contractors must be equipped with the proper tools in order to place themselves on a competitive basis with other contractors. Now, for the first time, we offer the wide-awake contractor our portable concrete rodding machine, which is the answer to the laying of low-slump concrete slabs with complete accuracy.

For the name of your nearest dealer—write

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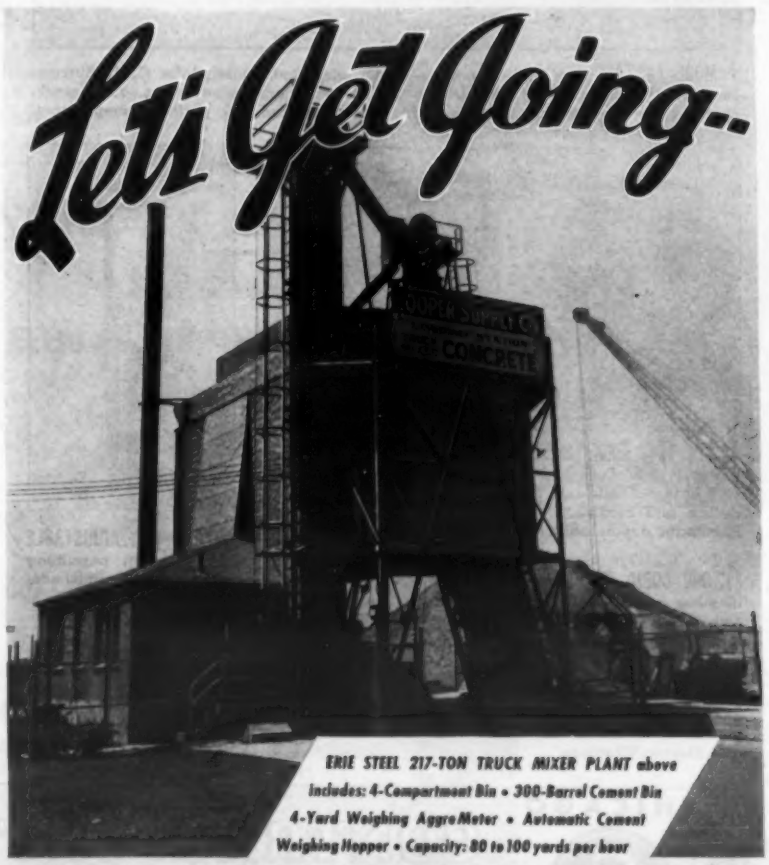

Let's Get Going..
ERIE STEEL 217-TON TRUCK MIXER PLANT above
Includes: 4-Compartment Bin • 300-Barrel Cement Bin
4-Yard Weighing AggreMeter • Automatic Cement
Weighing Hopper • Capacity: 80 to 100 yards per hour

PORTABLE & STATIONARY CONCRETE PLANTS — BUCKETS — BINS

IN ADDITION to a complete line of stationary and portable concrete plants and storage bins, Erie Steel builds 10 basic types of digging and rehandling buckets, including the time-tested Strayer Electric Bucket from ¼ yd. up to meet any bucket job. Erie Steel is close to 100% on Defense and geared to help on a Defense project that needs Erie Steel products. Let's Get Going!

ERIE STEEL CONSTRUCTION CO. • ERIE, PA.

Valuable Data from Roadside Park Study

(*Continued from page 25*)

parks are from out of the state and the publicity value to Indiana is considerable. Many rural communities are without organized recreational facilities and these simple parks provide for their needs.

The safety value of the parks can not be estimated but the hazard of only a third of the cars now using the parks being scattered along the highways seeking a safe spot to picnic, would obviously be dangerous and expensive. Damages to fences, woodland and other private property would also be a factor. Furthermore, the rested driver and his family, refreshed by an hour in a roadside park, are not the hazard to the driving public that they would be without this rest. This will become increasingly important as defense restrictions cut efficiency of cars and tires.

Indiana has kept roadside park facilities simple and durable. Expensive layout and facilities would quickly run the cost of use per capita to a figure out of line with ordinary economy. This might be justified by states having particular tourist or recreation problems, and often high daily use will keep the per capita cost down.

It would follow from these figures that a State Highway Department should be ready to spend from $1,000.00 to $2,500.00 for initial construction and about $250.00 per year for maintenance (these figures for 3-acre tracts or less) before embarking on a Roadside Park Program.

Roadside Parks and Defense

This paper would not be complete at this time without discussion of the Roadside Park and defense. Too many agencies are trying to justify their programs by tying them to the defense kite. But roadside parks have already become of distinct recreational value in our daily life. As such, if they are justified in time of peace, they are valuable to national morale and stability in time of war. In Indiana they are too small for military value although the water supply might often be of use.

They require little or no strategic materials in construction. They are widely distributed and serve thousands of people annually. Consideration of the long-term fundamentals involved will readily justify any reasonable program of highway roadside parks. It does behoove all highway administrations, however, to realize that they cost definite sums of money and that these sums should be kept in proper relation to highway expenditures in general.

Proper lubrication and careful maintenance will keep your equipment operating longer and more efficiently.

Study of Use of Indiana Roadside Parks—1941

		Total Sunday	Per Cent	Total Monday	Per Cent
TOTAL (15 parks)					
VEHICLES	STOPPING	772	100	234	100
	Passenger cars	747	97	223	89
	Trucks	15	2	28	11
	Motorcycles	9	1	1	0
	Indiana vehicles	584	76	130	51
	Foreign vehicles	188	24	124	49
PERSONS	STOPPING	2,999	100	754	100
	Male adults	1,129	38	290	38
	Female adults	1,190	40	291	39
	Children	680	22	173	23

RECAPITULATION—TOTAL ESTIMATE 40 PARKS
(Each 3 Acres or Less)

Season { 20 Sundays / 100 Weekdays — On basis of above, 361,000 people in 100,000 cars will visit 40 parks during the 1941 summer season. Approximately 30% will be from out-of-state.

Average attendance per park per season—9,025.
Average unit cost, 40 parks—Right-of-way and construction, $1,614.39.
Average maintenance cost per park—Estimated from maintenance figures for 3 years—$250.00 yr.
Range of cost, 40 parks—$650.00 to $8,344.58 (Lincoln Ferry).

Use study—elapsed time	Total Sunday	Per car Sunday	Total Monday	Per car Monday
	56 Hrs.	1 Hr.	9 Hrs.	40 Min.
15 parks—per park	13 Min.	12 Min.	23 Min.	

Average cost per park per year (on 20-year basis) $337.10.
Average cost per car per stop (on 20-year basis) $0.13/car.
Average cost per person per stop (on 20-year basis) $0.037/person.

Portable Overpass Solves Temporary Traffic Jams

To solve the problem of greatly increased traffic in some sections, and of heavy temporary traffic congestion at various points, R. G. LeTourneau, Inc., Peoria, Ill., has developed the Tournapass, a portable low-cost overpass designed to eliminate temporary traffic congestion at intersections.

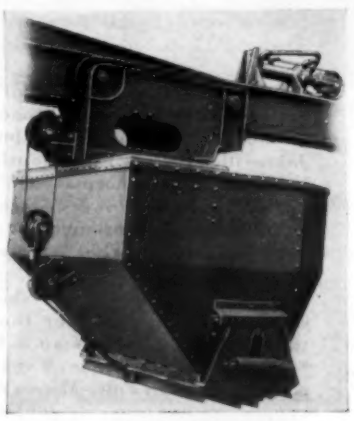
The Tournapass is a steel structure which fits into the traffic lane. Its outside width allows for hauling or shipping by truck or railroad, and its inside width will accommodate all types of cars and trucks. It can be used singly or in pairs to eliminate traffic delays and congestion.

A new 4-page booklet describing the Tournapass and containing photographs, actual time studies and car counts at a recent demonstration and trial period, has recently been issued. Copies may be secured by interested state and county highway engineers and by contractors direct from R. G. LeTourneau.

"The greatest advancement since the advent of the Dual Drum"

The New Ransome Hydraulically Controlled Boom Bucket

Ransome 34-E Dual Drum Paver, with Hydraulically Controlled Boom Bucket, at work on a large eastern airport.



Pat. Applied for

The Only Hydraulically Controlled Paver

LOOK over these advantages made possible by the new Hydraulically Controlled Boom Bucket—available only with Ransome 34-E Single and Dual Drum Pavers.

1. Eliminates split batches.
2. Can discharge small portions of concrete, close doors and move boom to other locations.
3. Saves time of bucket travel for split batches.
4. Doors open or close to any degree at any position on the boom.
5. High clearance to clear strikeoff.
6. No mechanism in carriage to wear and get out of order.
7. No inside or outside levers, arms, etc., are used.
8. Positively no leakage through doors.
9. Large unobstructed opening permits quick discharge of dry concrete.
10. Less wear on the boom bucket cables. Operator does not have to throw boom bucket clutch in reverse to trip the bucket.
11. Less wear on boom bucket clutches. Not necessary to clutch for tripping the bucket to discharge concrete.

These are only a few of many advantages. Bulletin No. 195 tells the complete story. Write for copy.

RANSOME CONCRETE MACHINERY COMPANY
Dunellen New Jersey

Engineering Leadership

MADSEN ASPHALT PLANT EQUIPMENT offers greater portability—all units are within 8-feet overall width and of a height which when loaded on a low bed trailer is within 13'6" from ground to top—fewer chain drives—and many real productive features. No other plant offers all the features found in this Madsen unit, backed by over 25 years' experience.

When you buy, or contemplate buying new asphalt plant equipment, be sure you look into the plant that leads the way Out West.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

C. & E. M. Photo
The turnbuckle and ratchet jack used to set the Blaw-Knox steel forms in the Youghiogheny Tunnel.

Handling Concrete For Outlet Tunnel

(*Continued from page 7*)

forms after the last pour. The tunnel invert was poured first with the equivalent of 90 degrees of the tunnel barrel and then the remaining 270 degrees as the second pour, using the collapsible steel forms. With an 8-inch line from the Pumpcrete the contractor used a maximum of 1,000 feet of pipe with a 30-foot lift and two 90-degree angles and two 45-degree angles in the line. A wooden follower jumbo behind the travelers for the forms carried the Pumpcrete line to the top of the forms. This wooden jumbo also carried an air receiver to supply adequate pressure for the operation of the four Ingersoll-Rand pneumatic vibrators used in the concrete and also for blowing back the Pumpcrete line to clean it at the end of a pour. An additional service performed by this receiver was to furnish the air for the jolt given to the concrete in the discharge line when packing the crown. A 1½-inch air line was tapped into the last section of the 8-inch Pumpcrete line and when concrete was being delivered for the very top of the forms intermittent shots of high-pressure air were injected into the line to speed up the delivery and pack the concrete tightly.

The method of operating the Pumpcrete unit was to keep a full line of pipe from the machine to the center chamber from each of the set-ups at the tunnel portals. Then the line was broken for pouring an invert or for a barrel pour or the full length was used when it was desired to deliver concrete for pouring a section of the chamber. The concrete-placing crew consisted of the four vibrator men, two men working with the "slick" line, one service man on lights and the power line, one air man at the receiver to manipulate the valves, the paver man who also watched the Pumpcrete agitator, the Pumpcrete man and a foreman. The pouring of the barrel was done with eight 5-foot lengths of slick line manipulated by the two "thin men" in the 18 inches of space between the forms and ribs. The 5-foot lengths were removed as the concrete piled up and was packed in the crown by the jolts of high-pressure air.

The forms were stripped in 30 hours after the pour was completed and the concrete immediately sprayed with Hunt Process blended asphalt to insure a proper cure by retaining all moisture within the concrete. The slight lip between the invert and the barrel, that is grout which leaked between the barrel forms and the invert during the pour, was removed by hand finishers using sledges and cold chisels.

Three-inch pipe was placed in the lining on 12-foot centers through the 18-inch minimum thickness of the lining for low-pressure grouting. This was done with the Pumpcrete machine.

The Control Shaft

A chamber 800 feet from the outlet end of the tunnel is connected with the surface by a shaft 32 x 24 feet and 145 feet high. In this chamber will be located three 4 x 20-foot gates operated by electric hoists from the top of the shaft for the control of the flow of water from Youghiogheny Reservoir so as to distribute flood flows in the river above over a long period and to prevent their synchronizing with the flood flows of the Monongahela River, of which the Youghiogheny is a tributary. A grout curtain was formed just downstream of the chamber by drilling radial holes

(*Concluded on next page*)

New Safety Scaffolding

A new low-cost safety steel scaffolding for use on jobs requiring a strong scaffold capable of carrying heavy loads is described in a new 8-page catalog recently issued by Mechanical Handling Systems, Inc., Detroit, Mich. The catalog not only gives details of this Quik-Set safety steel scaffolding but also explains the easy assembly and dis-assembly, which minimizes initial investment, storage and handling, it is stated.

Copies of this catalog may be secured direct from the manufacturer by mentioning this item.

Hydraulic Vise Catalog

The Studebaker hydraulic Visepress, made by the Studebaker Machine Co., 9 S. Clinton Street, Chicago, Ill., is more than a vise, according to the manufacturer. It is equally adaptable to small press operations and, because of its great power, will do bending, straightening, punching, testing, stamping, cutting, and other jobs efficiently. Controlled by foot pedals, it permits the use of both hands in setting up and removing work. From 1 to 10,000 pounds maximum pressure can be developed between the jaws.

A new bulletin recently issued describes and illustrates the Visepress, its many applications, and features of construction. Copies may be obtained by writing direct to the manufacturer.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
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MACHINERY & EQUIPMENT CO., Inc.
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Brooks LOAD LUGGER "Keeps 'em Going"

Brooks Load Lugger dumping riprap into open freight cars. Applicable to many similar materials.

It's the *continuous* hauling and dumping of bucket-loads of material while the workmen are filling the empties that speeds up your contract schedules. With the Brooks LOAD LUGGER System, you can increase truck efficiency, save time and cut costs on hand loading jobs. One LOAD LUGGER-equipped truck with several dump buckets is equal to a whole fleet of ordinary trucks in daily yardage handled.

Attention! CONTRACTORS AND ENGINEERS: Ask for details of our Special Introductory Offer of a two weeks' trial of the Brooks LOAD LUGGER.

Brooks Load Lugger feeding crusher at a steady rate all day long. A sure way to get maximum production.

LOAD LUGGERS are essential equipment for essential industries.

702 Davenport Road
Brooks EQUIPMENT AND MFG. CO.
Distributors in all Principal Cities
KNOXVILLE · TENNESSEE

Brewster Airport...

Seaman Pulvi-Mixer powered by a Model 6MZR Waukesha Power Unit

A DEFENSE CONSTRUCTION miracle

Paving 5800 lin. ft. of Runways
100 ft. wide in 8 days with the help of Waukesha Power

More *Buccaneer* and *Bermuda* dive bombers! This demand means a new factory to make them. And a new airport, with paved runways, to test them . . . an airport that normally takes a year to build. Brewster Aeronautical Corp. couldn't wait that long.

By substituting soil-cement runways for the conventional macadam or concrete, the airport was built at Johnsville, Pa., in four months—at less than half the normal cost.

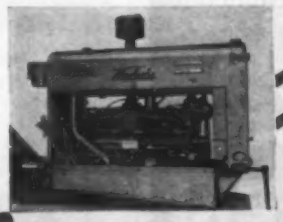
And Waukesha Power . . . always a vital factor in construction . . . has helped to work another defense miracle.

Special machines, like the one shown here, were used by the contractors, D. W. Winkelman & Co. of Syracuse, N. Y. These Waukesha-powered Seaman Pulvi-Mixers mix in 15% Portland cement while pulverizing the soil. Then, after power spraying with water, they mix the water with the cement soil combination.

Mounted directly on a rotor shaft . . . and driven at great velocity by the Model 6 MZR W ukesha self-contained Power Unit . . . the mixer tines dig into the material, creating a virtual tornado. Hurled against the hood-housing at 90 miles an hour, the materials are mixed with remarkable rapidity and thoroughness.

Actual laying of the runways, start to finish, took only eight 24-hr. days. Waukesha-powered equipment is the kind you *can* push 24 hours a day. Waukesha Gasoline and Oil Engines for Industrial, Stationary and Automotive Power range in size from 5 hp. to over 300 hp. *Get Bulletin 1079.*

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES



MORE POWER FOR DEFENSE
WAUKESHA ENGINES

C. & E. M. Photo

Charles H. Wagner, Resident Engineer, U.S.E.D., (at right), and A. J. Cole, Superintendent for Herman Holmes, contractor, at the downstream portal of the outlet tunnel, Youghiogheny Dam.

Building Tunnel for Flood-Control Dam

(Continued from preceding page)

around the entire circumference of the tunnel and high-pressure grouting these holes with a Ransome pneumatic grouting machine.

Major Quantities

The major quantities involved in the construction of the outlet works for Youghiogheny Dam, built at an estimated cost of $757,415.00, were as follows:

Common excavation	68,000	cu. yds.
Rock excavation	7,500	cu. yds.
Special rock excavation	1,080	cu. yds.
Tunnel and shaft excavation	31,000	cu. yds.
Bracing and timbering in tunnel	1,410,000	lbs.
Rock treatment, 1 coat (squares of 100 sq. ft.)	115	squares
Fill	7,800	cu. yds.
Rock paving	1,460	sq. yds.
Drilling grout holes in rock or concrete	480	ft.
Drilling foundation anchor holes in rock, percussion	235	ft.
Cement for curtain grouting	960	sacks
Furnishing cement	25,000	bbls.
Furnishing and installing reinforcing steel	540,000	lbs.
Concrete in intake and tunnel outlet	5,100	cu. yds.
Concrete, tunnel lining and control shaft	13,700	cu. yds.
Concrete, control tower	1,400	cu. yds.
Installing equipment furnished by Government	440,000	lbs.
Furnishing and installing miscellaneous metal	126,000	lbs.
Furnishing and installing black steel pipe	4,600	lbs.
Furnishing and installing special cast iron	3,200	lbs.
Welding, corrosion-resisting steel rod	50	cu. ins.
Welding, structural steel rod	50	cu. ins.

Bids were received for the construction of the outlet works at Youghiogheny Dam on May 8, 1940, and the contract was awarded on June 11, 1940, allowing the contractor 630 calendar days for the completion of the works.

Personnel

The contract for the construction of the outlet works at Youghiogheny Dam was awarded to Herman Holmes of Crystal Falls, Mich., for whom A. J. Cole was Superintendent. The work was done under the direction of the Pittsburgh office, U.S. Engineer Dept. Lt.-Col. D. Lee Hooper, District Engineer, with Charles H. Wagner as Resident Engineer.

Davey Increases Set-Up For Dealer Cooperation

Following the Davey Compressor Co. policy of working closely with its dealer organization through this critical period, G. G. Kingsbury of that company has taken on the additional duties of Sales Promotion Manager, and his office will also serve as a clearing house for the exchange of priority information and its relation to dealer sales.

Mr. Kingsbury has had 20-years' experience in the sale of contractors' equipment and in dealer contacts, and it is believed that his functioning in this position will be of definite assistance to Davey dealers.

Used Equipment Bargains

We are liquidating several large modern contracting outfits. Write or wire us for price and description on any item you need, or for complete lists. Equipment for sale includes:

Tractors—all sizes
Scrapers—4 to 20 yards
Rooters—Heavy Duty
Compressors—Gas & Diesel
Concrete Mixers
Self-priming Pumps
Power Units—Gas & Diesel
Crushing & Screening Plants
Stone Chip Spreaders
Tank Car Heaters
Road Oil & Asphalt Heaters
Road Rollers
Sheep's Foot Rollers
Elevating Graders
Motor & Blade Graders
Power-Driven Road Brooms

Bituminous Distributors

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Simplex Jacks for Safety

They prevent sprained backs, ruptures and accidents on the lifting, lowering, pushing and supporting jobs that come up daily on every construction project.

Every Simplex Lever Jack guaranteed to lift its full rated capacity on cap or toe lift. Unbreakable trunnions — no fulcrum pins. Expansion rivets — no machine screws to loosen. 5 to 35-ton capacities.

Simplex Screw Jacks have malleable bases, a single large chrome-moly steel ball that reduces friction 88%, safety peephole in base.

Simplex Hydraulic Jacks have non-deteriorating Neoprene packing seals, pressure-tested malleable iron base and top nut, release valve shielded against breakage.

All Simplex Jacks are carefully inspected and tested.

Sold by leading supply houses.

TEMPLETON, KENLY & CO.
Chicago, Ill.

Better, Safer Construction Jacks Since 1899

Simplex Jacks
A better Jack for every job - many jobs for every Jack

THIS IS THE ONLY GREASE GUN WE HAVE FOUND THAT CAN HANDLE THE HEAVIEST TYPE OF WATER-REPELLENT GREASE!

J. L. FIRST, SHOP SUPT., CONSOLIDATED FREIGHTWAYS

Alemite Gun On 24-Hour Duty—7 Days a Week
Services a Truck in 15 Minutes—A Trailer in 10 Minutes

CONSOLIDATED FREIGHTWAYS operates 166 trucks and tractors and 188 trailers in the Pacific Northwest. Says J. L. First, Shop Superintendent, "This Alemite gun is the only grease gun we have found which will handle the heaviest type of water-repellent grease—the grade used in all our equipment.

"This gun is in use 24 hours per day, 7 days a week. When rigs come in, they are serviced while being unloaded and reloaded. It takes 15 *minutes to lubricate a truck and* 10 *minutes for a trailer*—which is about ⅔ of the time formerly required."

All fleet owners—including contractors operating a lot of motor equipment—can cut lubrication costs and speed lubrication service by using Alemite Barrel Pumps, delivering grease direct from original drums. Write for complete information today!

Another Product of STEWART WARNER

ALEMITE
REG. U.S. PAT. OFF.
Industrial LUBRICATION
1850 DIVERSEY PARKWAY, CHICAGO, ILLINOIS • BELLEVILLE, ONTARIO

ALEMITE HELPS THE WORLD GO 'ROUND

Ask anyone in Industry!

A feature of Lincoln welders is the improved simplified design of their dual continuous control.

New Arc Welder Control Does Away with Meter

Improved and simplified design of its system of dual continuous control for arc welding machines which eliminates the need for meters showing volts and amperes has been announced by the Lincoln Electric Co., Cleveland, Ohio. This new welding facility is made possible by current adjustments with the dual continuous control in conjunction with Lincoln's self-indicating dials.

These welders have both job selector and current control calibrated and equipped with dials which indicate the type of work and the number of amperes for each and every setting. It is claimed that this feature enables the welding operator to secure high quality welds and the highest possible welding speeds because he can vary both the slope of the volt-ampere curve and the amount of welding current independently and positively to suit every job encountered. Another feature of this welder control is that both voltage and current controls are continuous in operation, making possible literally thousands of combinations of voltage and current. Being continuous, the control can be advanced or retarded in increments as fine as desired.

Advantages of this new development, as outlined by the manufacturer, include: 1, ability to set and read the current from the dial; 2, elimination of trouble and expense resulting from meter breakage; 3, elimination of meter inaccuracy after a few months' use in the field; 4, availability of positive polarity reversal; and 5, ability to verify polarity quickly by noting the position of the switch handle.

Road-Mix Repairs Frost-Boil Areas

(*Continued from page 28*)

Pulvi-Mixer was pulled through the windrow, thoroughly mixing the asphalt and aggregate and showing up the lean spots where the windrow was larger in volume in proportion to the standard rate of application of the asphalt. The distributor immediately returned over the windrow and gave an extra application of asphalt at those points. Immediately following this the blade again turned over the windrow and the Pulvi-Mixer went down the windrow and completed the mixing. This was repeated again if lean spots still showed up in the mix. During the mixing two men with stone forks took out over-size stones.

Two interesting commentaries on the method of mixing may prove of interest to counties and others doing this type of work on narrow roads where it is necessary for traffic to use the highway and where cars must cross from one point to the other because of the operation of equipment. When the windrow was placed in the center of the road and flattened by the blades, the sides were quite steep so that it was a distinct shock to the front wheels of a motor vehicle to strike it and mount the windrow to cross to the other side. However, when the Pulvi-Mixer had worked this windrow it left the sides sloping so that traffic crossed readily from one side of the road to the other. The mix by the machine was unusually live and fluffy, in distinct contrast to the heavy-type compact mix which is secured when the work is done entirely by blades.

Following the mixing the windrow was spread 22 feet wide and compacted by traffic with no rolling by equipment.

With the equipment and methods described, the Barron County Highway Department mixes close to 2 miles of material per day working from 10 to 14 hours. E. M. Rogers is Highway Commissioner of Barron County, Wisconsin.

Membrane Cure for Concrete

The Johnson-March Corp., 52 Vanderbilt Avenue, New York City, has recently issued a new catalog on Ritecure-G, a membrane colorless cure for concrete. Curing with Ritecure holds the moisture in the concrete during the most critical period, thus preventing surface dusting, minimizing hair checking or crazing, and assuring a surface which provides resistance to abrasion or wear, according to the manufacturer. It is reported that Ritecure has been widely and effectively used on pavements, runways, walls, bridges, dams, etc.

This catalog describes the material at length, and presents information on methods of application and quantity required. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

KILLEFER MATERIAL MIXERS

A WORLD RECORD! Using Killefer Material Mixers and Disk Harrows, 17,938 square yards of 6-inch soil-cement were processed in a single day for runways at the Flying School Airport in Albany, Georgia.

Built extra heavy to work with high-powered tractors, Killefer Material Mixers are equipped with rubber tires . . . Timken bearings . . . 12 double coiled spring-steel standards . . . double-end points . . . and crank-type depth regulator. Available with 42- or 70-inch wheel tread.

Depth control, heavy-duty construction, and easy-handling features are just a few of the many reasons why contractors prefer Killefer Disk Harrows. For faster airport construction, see Killefer equipment at your Caterpillar dealer's.

KILLEFER MFG. CORP., 5525 DOWNEY ROAD, LOS ANGELES, CALIF.

SOLD BY "CATERPILLAR" DEALERS EVERYWHERE

WILLIAMS

WILSTA-FORM EXTRA

"SUPER-HI"

TENSILE TIE RODS

INEXPENSIVE U. S. STANDARD THREAD RODS

¾" long thread, each end ¼" diam. U. S.—20 thread. 6,000 lbs. Ultimate Tensile 4,800 lbs. Working Load per Rod			¾" long thread, each end ⅜" diam. U. S.—16 thread. 9,500 lbs. Ultimate Tensile 7,500 lbs. Working Load per Rod			¾" long thread, each end ½" diam. U. S.—13 thread. 16,500 lbs. Ultimate Tensile 13,000 lbs. Working Load per Rod		
LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width
12" or less	$2.00	15" or less	12" or less	$3.88*	15" or less	12" or less	$4.80*	15" or less
13"	2.17	16"	13"	3.25	16"	13"	4.33	16"
14"	2.33	17"	14"	3.50	17"	14"	4.67	17"
15"	2.50	18"	15"	3.75	18"	15"	5.00	18"
16"	2.67	19"	16"	4.00	19"	16"	5.43	19"
17"	2.83	20"	17"	4.25	20"	17"	5.67	20"
18"	3.00	21"	18"	4.50	21"	18"	6.00	21"
19"	3.17	22"	19"	4.75	22"	19"	6.33	22"
20"	3.33	23"	20"	5.00	23"	20"	6.67	23"
21"	3.50	24"	21"	5.25	24"	21"	7.00	24"
22"	3.67	25"	22"	5.50	25"	22"	7.33	25"
23"	3.83	26"	23"	5.75	26"	23"	7.67	26"
24"	4.00	27"	24"	6.00	27"	24"	8.00	27"
Price per add'l inch	$.0015	Figure rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple	Price per add'l inch	$.0023	Figure rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple	Price per add'l inch	$.0031	Figure rods from 2" to 5" less than Wall for Vibra-Lock or nearest 3" multiple
Price per add'l foot	$.018		Price per add'l foot	$.0276		Price per add'l foot	$.0372	
Price per add'l 100 ft.	$1.80		Price per add'l 100 ft.	$2.76		Price per add'l 100 ft.	$3.72	
Lengths over 20'0" add for Williams High Tensile Couplings per 100	$2.75		Lengths over 20'0" add for Williams High Tensile Couplings per 100	$3.75		Lengths over 20'0" add for Williams High Tensile Couplings per 100	$4.75	

* Rods under 13" in length knurled to prevent turning in concrete.

Immediate 24-Hour Service — PHONE 3-3823 Day or Night

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Use Williams Form Clamps for Best Results

Williams Vibra-Lock—for Dams, Bridges, Heavy Construction, Battered Walls, etc. Williams Simplex—for Commercial Buildings, Sewage Disposals, Filtration Plants, Architectural Concrete, etc.

(Freight allowed anywhere in U. S. on order of 100 sets or more at list.)

Send us your plans: We figure the ties, showing locations, etc.

Williams Form Engineering Corp., 46 East Hall St., Grand Rapids, Mich.

Push-loaded with a 100 H. P. Crawler Tractor, this Heil Hi-Speed unit picks up heaped 15 yard loads in 40 to 50 seconds.

Depend on HEIL HI-SPEED CABLE SCOOPS for Bigger Yardage and Lower Costs!

Heil Hi-Speed Tractor Scoops Give You Fast Profitable Dirtmoving at New Low Cost Per Yard

The new Heil Hi-Speed Cable Scoops are matched Tractor-Scraper units designed and built for long, fast dirtmoving service. These large capacity Heil units (15 cu. yd. heaped measure) are quickly pusher-loaded in 40 to 50 seconds. They haul on rubber tires at fast travel speeds (up to 20 M. P. H.) and spread loads evenly with a positive "tilting floor" pushout.

Heil engineers, backed by years of dirtmoving experience, have provided Heil Hi-Speed Units with every possible feature for safe, economic operation. Compare these working advantages: Scientific weight distribution . . . Effortless hydraulic power steering . . . Short turning radius . . . Individual and Unit-controlled air brakes . . . High ground clearance . . . Comfortable spring supported driver's seat . . . 150 H.P. Cummins Diesel engine . . . Fluid Coupling drive . . . Fast, positive Heil Cable Control insures dependable Scoop operation.

Ask your nearest Heil Distributor for new Heil Bulletin Z2071 which gives complete details and specifications of the Hi-Speed Unit — or write, wire or phone for your free copy today.

THE HEIL CO.

MILWAUKEE, WIS. • HILLSIDE, N. J.

Above: Positive down pressure on the blade speeds up operation of this Model HT 60 Heil Trailbuilder and Model DD Cletrac, side casting shale over embankment.

Right: Six-Yard Heil Twin-Cable Scoop and Model DD Cletrac Tractor building road bed for Northern Pacific Railroad.

A novel concrete-handling set-up for a midwest ordnance plant.

Flat Car Shuttles Concreting Outfit

Along with the speed-up of construction in connection with the war effort comes numerous ideas and innovations which will establish new practices in future construction. Contractors and engineers are taxing their facilities to the utmost in cutting corners, figuring and planning new and quicker ways of doing old jobs, readapting equipment and methods to meet changing practice and speed up the work. On practically every defense-construction project you will find some new approach to a job that will help to get it done sooner.

Typical of this is an unusual set-up being used by the Fruco Construction Co. at a mid-west ordnance plant. A heavy-duty ¾-yard Bay City diesel crane and a 45-foot tower are mounted on a 50-foot flat car as a combination for delivering concrete from a truck mixer to an elevated bin which is equipped with two chutes, one for the first floor and one for the second. This makes it possible to pour at two floor levels without moving the equipment or changing chutes. The concrete is handled in a 1-cubic yard concrete bucket on a single line. At the time the accompanying photo was taken the approximate average daily pour totaled 540 yards in a 9-hour shift.

The structure is 1,200 feet long and the flat car is moved from one setting to another by using a dragline cable on the front drum of the crane. The cable is anchored by a hook to the rail or tie. Thus the complete unit can be moved the exact distance required in either direction. When necessary, the ramp for the truck mixer is moved by the crane to a new location. However, the large capacity of the crane and the use of a 50-foot boom make it possible to reach out at a long radius to pick up the concrete bucket for discharging into the bin.

This method of concrete handling has proved to be very satisfactory, giving high performances and permitting bigger yardages of concrete to be poured at lower cost and in shorter time, it is reported.

Creosoted-Wood Structures

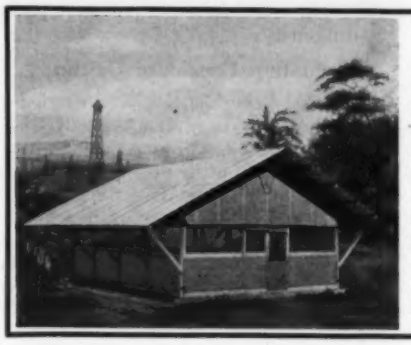
Grade crossing structures of laminated panels for pressure-creosoted wood are described in a leaflet, Form G-3, recently issued by the Wood Preserving Division, Koppers Co., Pittsburgh, Pa. It presents the advantages of such grade-crossing structures, service results and construction and installation details.

Copies of this leaflet may be secured by interested contractors and state and county highway engineers direct from the producer by mentioning this item.

New Skilsaw Catalog

"Tools for Defense of America" is the title of the new general catalog recently issued by Skilsaw, Inc., 4769 Winnemac Ave., Chicago, Ill., which describes the complete line of Skilsaw portable tools for production, construction and maintenance. These tools include a wide variety of saws and saw blades, electric drills, grinders, belt disk and floor sanders, abrasive disks, blowers and blower attachments, bench grinders, and general accessories. In addition to descriptions and illustrations of the various Skilsaw tools, the booklet contains photos of various defense construction jobs on which Skilsaw equipment played a part.

Copies of this new catalog No. 43 may be secured by interested contractors and state and county highway engineers direct from the manufacturer or from this magazine.



TROPICAL HOUSING

Contractors who have work in our southern states, tropical or semi-tropical countries should write for literature describing our 100% *Portable Houses*, which have been in use by oil and engineering companies since 1920. (Cubic measurement of the 18'x24' Portable House pictured here is 208 cubic feet boxed for shipment. Four inexperienced men can erect it in a few hours.

MONROE CO., 50 Bridge St., COLFAX, IOWA

ARE YOU A QUALIFIED
Barber-Greene
OPERATOR?

Qualified Operators of Barber-Greene

Mixers
Finishers
Bucket Loaders
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who successfully apply are registered by the B-G Service Department and receive a Certificate and watch fob medallion engraved with the operator's name and machine he operates. (300 hours required minimum.)

We file registrations so as to serve machine owners who want operators, or operators who are not employed.

This is rigidly restricted to qualified operators. Fobs or certificates are not available to others.

If you have had over 300 hours operating experience on any of the above Barber-Greenes, write for application form.

41-13

BARBER GREENE
AURORA ILLINOIS

SPEED UP THESE DEFENSE JOBS

AIRPORT RUNWAYS
DEFENSE PLANT HIGHWAYS
ARMY CAMP STREETS

WITH
STANDARD OIL
ASPHALT

★ **WHEELS,** whether they are on planes, army trucks, or defense workers' cars, must have some place to roll —wide, smooth, all-weather surfaces to speed them on their way. Asphalt offers all of these, plus unusual speed and simplicity of construction. Here are a few reasons why:

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- Asphalt surfaces may be built up to a wide variety of specifications, each designed for the traffic load and other local conditions to be met.
- Asphalt construction requires the shortest possible time from the start of the job to a traffic carrying finish.

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Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

Concrete Access Road To New Bomber Plant

(*Continued from page* 12)

non-extruding felt and mastic were set at 120-foot intervals in the concrete slab and contraction joints were spaced 40 feet between. The contraction-joint steel consists of two sections of eight dowels each of ¾-inch round bars greased for one-half their length of 2 feet 3½ inches and tied to ½-inch round transverse bars, one spaced 12 inches from the joint on the side greased and two on the other side spaced 3 and 9 inches respectively from the joint. After the contraction joint was cut, a ⅜ x 2½-inch premoulded strip was inserted and floated over.

The expansion-joint steel assembly consists of eight dowels, for a half width of the road, of ¾-inch round bars 2 feet 6½ inches long with the same transverse steel and spacing. In addition eight hairpins of ½-inch round bars approximately 8 feet long and bent in the form described were placed at all corners on both sides of the expansion joint.

The center strip inserted is ⅜ x 2½ inches and was made up in 10-foot lengths. The tie bars or tie dowels are 4 feet long of ½-inch round deformed bars and are spaced 5 feet on centers at the mid-height of the slab across the center joint. One man was required along the shoulder assembling the steel for contraction and expansion joints continuously.

Paving, Finishing, Curing

The Koehring 34-E paver carried a Carr Push Plane in front at all times except on curves, and also pulled a trail grader. Because of the dryness of the air and the intense heat during the paving of this 1.7 miles, two men were required sprinkling grade. One of them however also controlled the dumping of the trucks in the paver skip. When the two subgrade planers were attached to the paver one man was required on each side to shovel out the windrows from the front planer and to clean up along the side behind the second planer.

The concrete received a 70-second mix divided between the two drums of the paver and then was delivered to the slab and the bottom course struck off by a heavy screed pulled along the forms by the power winch of the paver. In the pit behind the paver four men were used to set the tie bars and joints and to bring in the 15-foot mat of welded fabric and to take care of sprinkling the grade. Two men shoveled in front of the strike-off and three to the front screed of the 2-screed Jaeger-Lakewood finishing machine. As insurance against damage of the newly laid slab by sudden rains, 300 feet of burlap was carried on the finishing machine. Inasmuch as the Hunt Process cure was used on this slab, there was no other protection against damage by rain other than the 300 feet of burlap. A Viber machine with a Briggs & Stratton engine was used for vibrating both

(*Concluded on next page*)

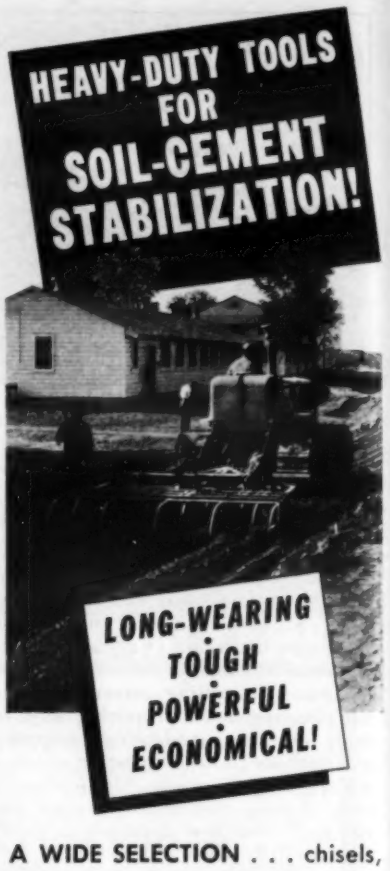

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ILLUSTRATION: Pulverizing Mixture With an Allis-Chalmers Model HD-7 Tractor and Chisel.

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Finishing and Curing Concrete Access Road

(*Continued from preceding page*)

edges of the pavement against the forms to prevent honeycomb, and around all joints to insure a dense concrete and good bond between the dowels and the concrete.

Water for the paver was taken from the city mains about 2½ miles from the job, metered at the hydrant, delivered to a circular stock tank by two Worthington portable triplex pumps, and thence delivered to a 3-inch pipe line laid along the new grade out to the paving operation.

The center-strip machine which moved immediately behind the finishing machine was equipped with its own cutter and a specially designed feeder which insured the placing of the pre-moulded strip in a straight line as the feeding end of the unit was always maintained on the center line by the flanged wheels of the machine. After cutting the contraction joints with a saw-tooth cutter equipped with plow handle, an unequal-leg cap in two lengths with the pre-moulded fabric was inserted in the slot by the same men who placed the center strip. The center strip machine was moved ahead by the Koehring longitudinal finisher.

Following the mechanical bull-float, the first two finishers, one on either side, used a 10-foot straight-edge to "float" the surface rather than drag it, and this was followed by the use of a long-handled hand float if required to work up a grout on the surface or where material must be added to a low spot. An 8-inch canvas belt was then seesawed over the surface which was immediately checked with a second 10-foot straight-edge, followed by the pulling of a second 8-inch belt. Where no lip curb was installed these finishers edged the sides of the pavement. The last operation was the joint cutter working from a special bridge who lifted the caps on the contraction and expansion joints and edged them.

Curing was done with a very light fog of Hunt Process curing compound which scarcely showed on the pavement although light stains could be detected in spots, due to the inequality of application.

C. & E. M. Photo

The curing was done by the Hunt Process, spraying the asphalt blend over the surface of the concrete.

Lip Curb

Whenever the grade exceeded 1 per cent, lip curb was built on both sides of the pavement to prevent washing of the shoulder. The curb is 3 inches high built against a 3-inch form, is 3 inches wide at the top and feathered out on a straight line to nothing at 12 inches from the edge of the slab. Two curb tenders on each side placed the curb forms and hauled the concrete from the mixer and shoveled it into place, after which one curb builder on each side floated it and finally shaped it with a steel mule.

Personnel

The contract for the 1.7 miles of concrete paving 22 feet wide, known as Project AI-FAS-112-A (1), was awarded to the Western Contracting Corp. of Sioux City, Iowa, on its bid of $48,318.12 for concrete paving alone. Harry Woods was Superintendent on the concrete paving operation. For the state highway department, Lee Odman was Project Engineer.

Wm. S. Richardson Promoted

Announcement has been made by the B. F. Goodrich Co., Akron, Ohio, of the appointment of William S. Richardson as General Manager of Sales for Goodrich mechanical goods and sundry items, succeeding J. H. Connors who has resigned because of ill health.

Mr. Richardson, who entered the rubber industry in 1914, joined the B. F. Goodrich Co. in 1926 on the staff of the Assistant Works Manager. He has held several different positions since that time, most recently being Merchandizing Manager of the Mechanical Goods Sales Division.

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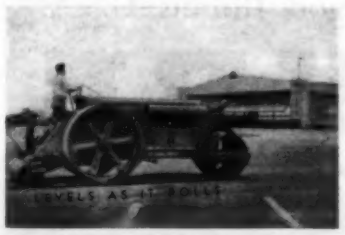

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TELSMITH PLANT speeds construction of Army Ordnance Works

Under hopper, 36" x 12' Telsmith Heavy Duty Apron Feeder delivers to 24 x 36 Telsmith Roller Bearing Jaw Crusher.

★ For the new powder bag-loading plant at the New River Ordnance Works near Radford, Va. 300,000 tons or more crushed aggregate will be required. To supply it the Pendleton Construction Corp. of Wytheville, Va. with the co-operation of Telsmith engineers built a new crushing plant near Dublin, Va. It is Telsmith equipped *throughout!*

Actual crushing began March 13, 1941, and by the end of July, 170,000 tons of aggregate had been turned out. The capacity naturally varies—from 150 tons to 100 tons per hour—depending upon the sizes produced. Six different sizes of finished products can be made.

The plant amply demonstrates *Telsmith planned production.* Properly co-ordinated and balanced, all units are working smoothly —giving flexibility as to sizes, and dependability as to quantity and quality of product. That's as typically Telsmith as the low cost per ton.

Each of the three Telsmith Crushers (Jaw, Gyrasphere, Roll) is driven by its own Diesel. A Diesel-electric generator supplies current for the individual electric motor drives on the Telsmith Apron Feeder, the two Telsmith screens and the four Telsmith-Barber-Greene Steel Frame Belt Conveyors.

For details on Planned Plant Production by Telsmith—get *Bulletin Q-34.*

Telsmith 4'x12' two-deck Pulsator over small loading bin. Rejects from the top deck are recrushed by the Gyrasphere.

No. 48 Telsmith Gyrasphere, in closed circuit with 3-deck screen, recrushes the top deck rejects.

4'x12' Telsmith 3-deck Pulsator over main storage bins, grades stone into three sizes.

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Priority Procedure For Highway Field

(*Continued from page 20*)

as to new equipment and new construction.

Types of Ratings

There are several types of ratings used to reflect the relative importance of a finished item and to give the right-of-way on production schedules and order books of prime contractors, subcontractors and suppliers. They are:

(1) Individual preference ratings for military items. These are assigned by contracting officers to Army, Navy, Lend-Lease and foreign-government orders.

(2) Individual preference ratings for non-military items. Ratings obtained for single orders for items not appearing on the "critical list" by making application to the Division of Industry Operations, War Production Board.

(3) Blanket ratings, which eliminate red tape and paper work involved in a mass of individual ratings. Certain industries or groups of producers in an industry have been issued ratings which may be applied to materials going into specified products.

(4) Project ratings. Single ratings may be issued for all materials going into a specified construction job.

(5) Production Requirements Plan ratings, a single rating issued for that proportion of a firm's material requirements needed to fill military orders and those which come under the heading of essential civilian requirements, this proportion being based on their ratio to all business for the preceding quarter.

(6) Repair, maintenance and operating supplies ratings. Order P-100 provides that an A-10 rating may be used by any firm falling into 14 broad industrial classifications in obtaining materials required for repair, maintenance and operating supplies. It also applies to governmental agencies.

Since (4) and (6) are of particular concern in the civil-engineering field, they will be discussed in detail.

Highway Priorities

A broad program of priorities assistance for highway construction was first outlined by the Priorities Division of OPM in a letter of intent, addressed to Thomas H. MacDonald on September 3 of last year. This set up six classes of favored roads, and the preference ratings to be granted.

These classes of projects include access roads, the strategic network of highways, the Federal-Aid system, Federal-Aid secondary and National Park and Forest projects, projects for the construction or improvement of the Inter-American Highways, and construction of the Trans-Isthmian and the Chorrera-Rio Hata Highway in Panama. The preference ratings on these classes of projects were published on page 14 of the October, 1941, issue of CONTRACTORS AND ENGINEERS MONTHLY.

Following up the letter of intent to Mr. MacDonald, on October 18, Donald M. Nelson made available Preference Rating Order P-19-e, which established procedure for the assignment of priority assistance to approved road-building projects.

Priority Procedure

The rating for highway construction is on the whole similar to previous project ratings granted for the construction of plant facilities and other defense installations. The highway rating is granted in the first instance only to the Public Roads Administration or a state highway department. The preference rating so assigned may be applied to deliveries to a contractor only by action of one of these, which must furnish one copy of the order to each of the suppliers with whom the contractor has placed a purchase order for material.

A supplier, in order to apply the preference rating, must execute an acceptance of the order and file it with the Division of Industry Operations, WPB, and furnish an additional signed copy to each of his sub-suppliers.

The initial rating for the project covers all material and equipment necessary to completion of the job. But in the case of orders placed by a supplier with a sub-supplier, the rating may be extended only to materials which will be physically incorporated in the project.

To receive priority assistance for highway construction, a letter of application must be addressed to the Project Rating Section, Division of Industry Operations, War Production Board. This letter must be submitted in triplicate and signed by a responsible officer of the organization seeking assistance. In particular, it must point out why the construction is vital to the national war effort.

A schedule of materials which the project will require must be attached. The Project Rating Section has prepared for this purpose a form called the "Project Requirements List of Critical Defense Materials" which calls for listing of the number of units in tons, pounds, size, etc., of various types of steel, copper, zinc, bronze, aluminum, power and equipment supplies, conveyors and machine tools.

When a state highway authority applies for a rating under P-19-e, these tests will be applied to the application: does the construction involve the use of an appreciable quantity of critical material; is the construction directly necessary for national defense?

The Public Roads Administration, the state highway commission, and each supplier who uses the preference rating must keep accurate and complete records for a period of two years. These records must show the kinds, values, quantities and delivery dates of material covered by the application, together with the name and address of the supplier. Furthermore, the records must show inventories and stocks on hand of the materials which have been ordered with the aid of the preference rating. Complete records of each contract and purchase order placed in connection with the project must be kept. Not only must these records be kept on file but a monthly report has to be made out by the supplier regarding all this information. This monthly report must be filed with the Division of Industry Operations on the fifteenth day of each month on Form PD-81.

Equipment Maintenance Priorities

Of particular importance to the high-

(*Concluded on next page*)

AMERICAN Safety-ized Pneumatic-tired **WHEELBARROWS**

You can help conserve steel and rubber for National defense by confining your wheelbarrow specifications to one of the SIX STANDARD NUMBERS in our NEW WHEELBARROW BULLETIN. One of these six numbers will fit into your job, and give you long wear that will surprise you. Your American *Safety-ized tires* will last twice as long as *ordinary* pneumatic tires; and, as you know, pneumatic-tired barrows outlast ordinary *steel*-tired barrows many times!

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Washington Author

The author of our article on Priorities, William J. Casey, as Chairman of the Board of Editors of the Research Institute of America, is in constant and close contact with both Washington authorities responsible for the defense activities of the Government and business leaders wrestling with the problems of a war economy. Recently assigned to direct the Institute's Washington Bureau, he operates between there and New York on a commuter's schedule. The constant flow of information and advice going out from the Institute to its more than 25,000 members places Mr. Casey at a pivotal point in the intricate business-government relationship in these exciting and difficult times.

Priority Ratings for Equipment Repairs

(*Continued from preceding page*)

way official and contractor is Order P-100. Under this, government agencies (including highway departments) can order material needed to repair, maintain and operate their equipment.

"Maintenance" here means keeping property and equipment in sound working condition. "Repair" means the restoration of the property to sound working condition if it has been rendered unsafe by wear, damage of parts, or similar causes. "Operating Supplies" are all those materials essential to the operation of the producer's business and consumed in the course of such business, including lubricants, catalysts, and small perishable tools.

Repairs, maintenance and operating supplies, do not include:

(1) Material which could not be carried on the books as such;

(2) Material for the improvement of property or equipment through the replacement of material in the existing installation, unless such equipment is beyond economic repair;

(3) Material for additions to, or expansions of, such property or equipment;

(4) Fuel.

The A-10 rating under order P-100 may not be used to obtain scarce materials where the substitution of more abundant materials is possible. To use order P-100, no specific allocation and no involved paper work is required. The rating may be applied by any government unit, including any person with whom a purchase order or contract has been placed for delivery to a producer or other supplier. To apply the order, it is necessary only to endorse all copies of purchase orders for materials of repair, maintenance and operating supplies, in the following manner:

Material for maintenance, repair, or operating supplies—Rating A-10 under Preference Rating Order P-100, with the terms of which I am familiar.

Name of Producer or Supplier ..... Signature of Designated Official .....

The endorsement must be made by a responsible official duly designated for such purpose by the producer, supplier, or government unit.

Orders for materials or withdrawals from inventory for repair, maintenance and operating supplies are permissible only up to 110 per cent of 1940 requirements, except in the case of enterprises or government units whose total volume of purchases or withdrawals from inventory do not exceed $5,000 quarterly. You may not order any material under Order P-100 if you can perform the repair work and still retain a practical working inventory of the material required. And you may apply the rating only to the extent necessary to restore your *minimum* inventory.

As with order P-19-e, you must retain endorsed copies of the purchase orders or contracts under order P-100, and must submit from time to time to audit and inspection by representatives of the War Production Board.

Toll bridges, toll canals and irrigation systems are all covered by Order P-100. That is to say, repair and maintenance work and the operation of such enterprises can be carried out with the assistance there provided.

A.S.T.M. Cement Standards

The compilation of the 1941-42 A. S. T. M. Standards on Cement, recently published by the American Society for Testing Materials, was prepared under the sponsorship of its Committee C-1 on Cement to provide a convenient source of reference to all of the A. S. T. M. tests and specifications for cement. Possibly the most important item in this compilation is the newly adopted standard giving specification requirements for portland cement (C 150-41). This provides chemical and physical requirements for five types, including high-early-strength, low-heat-of-hydration and high-sulfate-resistance cements.

Natural cement and masonry cement are covered in two specifications and the extensive methods of chemical analysis and sampling and physical testing of portland cement are given in their latest approved form with the Manual of Cement Testing and a group of selected references. Tests for compressive strength and fineness (turbidimeter) and the requirements for determining autoclave expansion are also given.

Copies of this 100-page booklet can be obtained from A. S. T. M. Headquarters, 260 So. Broad St., Philadelphia, Pa. Price; $1.00, or $0.75 if ten or more are ordered.

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Any contractor can save enough time, labor and material with this 3 H. P., Gasoline-Driven Power Unit to absorb its cost on the first few jobs. It's by far the most useful tool you could own. It can be operated in the most remote places . . . can be wheeled anywhere on the job . . . runs all day on 1½ to 2 gallons of gasoline. It is easy to start in cold weather and requires little attention. Interchangeable tools for the 9 every-day jobs listed above can be changed as quickly and easily as bits in a brace.

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A STANDARD Subgrader prepares subgrade at 50% to 90% saving!

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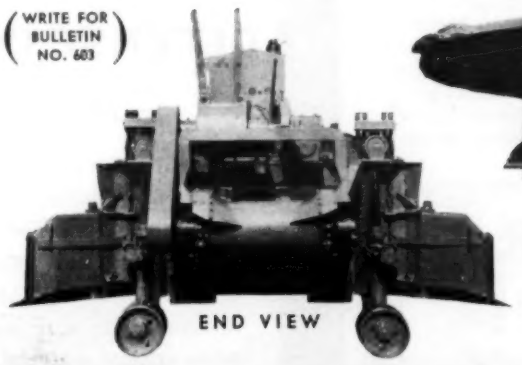
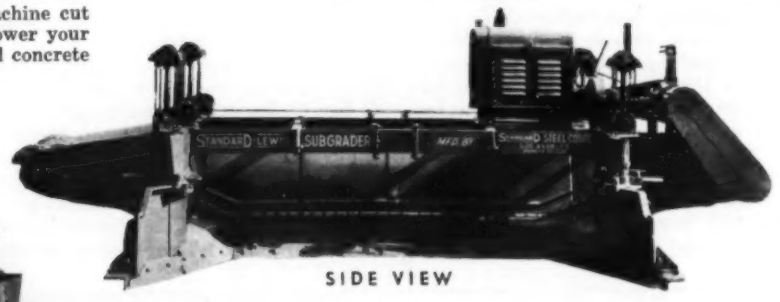


END VIEW



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And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. *Write us for further information.*

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We extend cordial greetings and a most hearty welcome for your coming convention in Memphis, Tenn.

HOTEL PEABODY

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Marquette County's Headquarters Garage

(*Continued from page* 17)

and such equipment as is required in that particular district. Where special snow-fighting equipment is stored, a special operator is assigned to it, and there is always an alternate fully trained as a relief operator. This policy is maintained throughout for special equipment to insure optimum production and best results. The county operates its snow plows on 12-hour shifts, changing crews in the field.

Headquarters at Ishpeming

The main office of the Board of County Road Commissioners of Marquette County and the Engineer-Superintendent is located in a 54 x 58-foot cinder-block structure alongside the main garage. This neat well-maintained building contains the office of the Engineer-Superintendent, a drafting room, an accounting room, and three large vaults for county highway records. This provision was made when the new office building was constructed because of the loss of many of the old county records through a fire in 1912. In the basement of the main office building the Welfare Department is housed.

The Headquarters Garage is a cinder-block structure 84 feet wide and 248 feet long, with the roof supported by steel trusses all designed for a 13,000-pound hanging load so that they may be used for any reasonable lifting job throughout the garage. The ceiling of the garage is of Celotex covered with asbestos paint and the roof is of composition roofing with wood rafters and steel purlins.

In rooms at the south end of the garage are cabinets with shelves for the storage of valuable small supplies and equipment that could easily be stolen. All cabinets are equipped with padlocks. Adjacent to this is the office of the General Foreman, who is in charge of all force-account operations of the County Highway Department and the shop. Adjacent to these is a storage room for small tools and materials needed from day to day, including tires, and other odds and ends needed in a highway organization. Back of this is the small-parts stock room, where repair parts are stored on steel shelves and an inventory of $15,000 to $20,000 in parts is maintained. This stock room and the entire shop are never closed, and are always ready to take care of any emergency repair or send equipment out onto the road at any time of the day or night.

FUNDS AVAILABLE FOR STREET AND HIGHWAY MAINTENANCE IN MARQUETTE COUNTY

	1939		1940	
Source of Funds	*Amount*	*Average per Mile*	*Amount*	*Average per Mile*
Real Property Tax, actual collection	$112,169.38	$ 90.06	$114,324.44	$ 91.78
Weight and Gas Tax, County portion	104,284.30	83.73	112,987.06	90.71
McNitt Maintenance Return	68,323.05	54.86	67,107.74	53.88
Snow Fund Return	12,256.98	9.84	10,069.28	8.08
Total Funds for County Roads	$297,033.71	$238.49	$304,488.52	$244.45

A locker and wash room is provided for the men, and adjacent to it is a welding shop with a wide Johnson rolling door which will admit the biggest plow owned by the county to the shop. In this shop also is a blacksmith forge, anvil, and, at the time of our visit the portable acetylene generator with its accessory tank of oxygen was operating. Below the welding shop and to one side is a small boiler room in a basement, and the coal bunker. All wiring for the office building as well as the shop is brought in below ground, and a steam tunnel connects the boiler room with the office building. Each section of the garage is closed off by a cinder-block curtain wall equipped with large fuse-plug-operated fire doors.

In the section devoted to the repair shop is a bench grinder and drill press and other equipment such as a portable crane for moving heavy parts, a power grindstone, power band saw, a long bench for the mechanics, a battery and tire repair outfit, and an old solid tire press. This shop is not a complete maintenance machine shop because of the availability of a large number of unusually well equipped mine repair shops and local machine shops owning equipment which the county believes would not be economical to install for occasional service. Additional equipment in the repair shop includes a magneto repair outfit, a valve refacing and grinding unit, an Ingersoll-Rand garage compressor, a Weaver mechanical press, a Kerrick Kleaner for cleaning all machine parts and bodies before repainting, and a spark-plug tester.

The main storage section of the garage for equipment consists of eight bays of 22 feet each. It has one 16 x 20-foot roller-type door at the end and another at the end of the west side facing the street. In this storage section is a grease rack and a complete pneumatic gun, with the outlet from the steam cleaner and water hose. This section of the garage, similar to all other parts, is kept comfortable in winter by means of steam unit heaters. The contingent of snow plows is stored back of this main garage in summer, prior to being overhauled in the late summer and early autumn ready for winter service.

A Service Building in the entrance driveway to the west of the main garage is a 16 x 20-foot cinder-block structure where gasoline, oil, diesel fuel, alcohol, and anti-freeze are stored. This is maintained to contain all combustibles, and is so spaced as to fulfill all fire insurance requirements and thus relieve other structures of high rates because of the proximity of fire hazard.

To the east and some 200 feet back of the main garage is a stone-masonry package warehouse, with four large loading doors and a platform at truck-body height. Each of the four sections is separated by fuse-plug fire doors to localize any possible fire damage. In this warehouse are stored paint, grease, and other materials which are purchased in package form and can be stacked readily for storage.

Separated from the other structures, and well covered with earth and properly ventilated, are two explosives magazines, one for dynamite and the other for blasting caps. Near to this location, approximately 7,000 cubic yards of sand is stored in preparation for ice control in winter. When used for spreading on the roads, 100 pounds of calcium chloride is added to each 1½ yards of loose sand in the pile, and more chloride is added in the truck as needed on certain roads.

A three-section Machinery Warehouse is located toward the back of the 20-acre yard, each section measuring 50 x

(*Concluded on next page*)

1881—1942

CONTRACTORS' EQUIPMENT

WHEELBARROWS

HOISTS SCRAPERS

MORTAR BOXES

CONCRETE CARTS, BARROWS

CONCRETE MIXERS:

(BATCH AND CONTINUOUS)

MORTAR MIXERS

BRICK and TILE BARROWS

HODS

etc., etc.

Write for complete information, prices

LANSING COMPANY Products

"Keep Your Products on Wheels"

LANSING, MICHIGAN

Chicago New York Kansas City Boston Minneapolis Philadelphia San Francisco Los Angeles

"TOOLS OF WAR COME FIRST!!"

Any other use of steel presents a challenge to every producer, designer, and user.

IN CONSTRUCTION ALONE, many THOUSANDS OF TONS of steel can be converted to vital armament through ADVANCED DESIGN and CONSTRUCTION ECONOMY to eliminate waste.

This is one of a series of recommendations for WEIGHT SAVING DESIGN to conserve wartime steel and production.

FOR REINFORCED CONCRETE DESIGN:

- TAKE ADVANTAGE OF HIGH YIELD POINT STEEL.
  Limit the use of structural grade wherever possible.
- PERMIT OPTIONAL USE OF RAIL STEEL OR BILLET STEEL.
  Use available material.
- SPECIFY STANDARD SIZES.
  Design exact reinforcement area with varied bar sizes. Use of one size throughout is wasteful.
- USE 25,000 LBS. PER SQ. IN. UNIT STRESS AS PERMITTED IN RECENT NATIONAL A.A.S.H.O. AND A.C.I. CODES.
- STREAMLINE LOCAL CODES TO SUIT NECESSARY ADVANCED DESIGN WHEREVER POSSIBLE.

ATTEND THE A.R.B.A. CONVENTION MEMPHIS, MARCH 2, 3, 4.

LACLEDE STEEL COMPANY
ST. LOUIS MISSOURI

DEFENSE BULLETIN

DEFENSE CONSTRUCTION

Must Be Served

A highly important part of the work this plant is doing for National Defense is meeting the demand for all types of hose necessary for construction, repair, and maintenance on Government projects. Such work must go on and is receiving the necessary priority required on rubber and other critical material.

For years Continental hose has been held in high regard in construction fields. In filling such indirect but none the less vital defense orders, all of us at Continental must be constantly alert to give them the same wartime speed and precision which this plant is maintaining on direct orders for Army, Navy and Air Force requirements.

The Equipment Roster Of Marquette County

(*Continued from preceding page*)

60 feet. This is used for storing out-of-season equipment, such as the large snow plows in summer and the magnet unit for picking up nails from gravel and dirt roads in winter. In the center of the yard is a loading dock, adjacent to which the ground slopes gently so that trucks with their beds at varying heights may load even with the top of the dock.

Equipment Roster

The roster of equipment used by a county the size of Marquette County is of considerable interest and shows the diversity of equipment which must be maintained to care for the roads in such a large area. While there are a number of pieces of equipment which are practically obsolete, including one Holt tractor and several Liberty trucks of World War vintage, in general the equipment is modern, up-to-date, and all of it is well cared for by careful maintenance.

Following is the equipment roster by types of equipment:

TRUCKS AND CARS

4 Walter 8-ton dump trucks
1 Walter 5-ton dump truck
1 Mack 7-ton diesel truck
4 Mack 5-ton dump trucks
1 Mack 3-ton stake-body truck
6 Mack 2½-ton dump trucks
1 Mack 2-ton dump truck
1 Mack 1½-ton dump truck
1 Oshkosh 5-ton truck
3 FWD 5-ton dump trucks
1 FWD 5-ton chassis for snow plow
1 FWD 3½-ton dump truck
1 FWD 2-ton dump truck
1 Reo 1½-ton dump truck
1 Reo 1½-ton panel truck
1 International ¾-ton panel truck
1 Liberty 3½-ton truck with box
3 Liberty 3-ton dump trucks
1 Liberty chassis with 700-gallon distributor
1 Pierce Arrow truck with magnet
1 Pierce Arrow 5-ton dump truck
1 Republic 5-ton dump truck
1 Graham 1-ton platform truck
1 Aviation 3-ton truck with water tank
1 Aviation 2½-ton truck with Willett grader
14 Ford 1½-ton dump trucks
5 Ford ¾-ton pick-up trucks
4 Ford ½-ton pick-up trucks
1 Ford station wagon
1 Ford sedan
7 Chevrolet 1½-ton dump trucks
4 Chevrolet ½-ton pick-up trucks
1 Chevrolet station wagon
6 Dodge 1½-ton dump trucks
1 Dodge sedan
2 Buick 4-door sedans

TRACTORS

7 Caterpillar Sixty tractors
1 Caterpillar Thirty tractor
1 Caterpillar Twenty tractor
1 Caterpillar RD8 tractor

POWER GRADERS

3 Austin-Western 12-foot blade motor graders
2 Adams 14-foot blade motor graders
2 Adams 12-foot blade motor graders
3 Caterpillar diesel 12-foot blade Auto Patrols

PULLED GRADERS

2 Adams King 12-foot blade graders
1 Adams No. 7 8-foot blade grader
1 Austin-Western 7-foot blade grader
1 Gilbert 12-foot blade grader
5 8-foot blade patrol graders
1 Caterpillar 12-foot blade grader
1 8-foot blade grader

SNOW PLOWS

2 Snogo rotary plows
1 Snow King rotary plow
1 Township special plow
1 Levi snow plow
5 Wausau V plows
11 Wausau truck plows
1 Wausau tractor plow
4 Marquette truck plows
5 Marquette hydraulic plows
2 Marquette V plows
3 Marquette reversible plows
1 Marquette S-501 plow
4 Marquette blade plows
1 Marquette snow wing
1 Frink truck plow
1 LaPlant-Choate tractor plow
2 Ross truck plows
1 Wisconsin V plow
2 Snow wings

SCRAPERS AND SPECIAL BLADES

4 Willett 10-foot blade scraper attachments
3 Jackobolce Monarch hydraulic 10-foot blades
2 Walter ice cutter underbody plow blades

ROLLERS

1 Sheepsfoot tamping roller
1 Airport roller
1 Clod-breaking roller
1 Fordson roller

POWER SHOVELS

3 Michigan truck shovels
1 P & H gas shovel

RIPPERS AND BULLDOZERS

3 Adams road rippers
1 Road ripper
1 Bulldozer
1 Angledozer

TRAILERS

1 Williams 35-ton 6-wheel trailer
1 Hiway 2-wheel trailer
2 Army 5-ton 4-wheel trailers
3 Army 1-ton 4-wheel trailers
3 Aviation 5-ton 2-wheel trailers

HEATERS

4 Littleford trailer bituminous heaters
1 White Model F2 bituminous heater

ROTARY SWEEPERS

1 Austin-Western sweeper
1 Studebaker sweeper

QUARRY AND GRAVEL PIT EQUIPMENT

2 20-yard crushers
1 Steam drill
1 Sullivan steam drill
2 Tripod drills
2 Cleveland sinker drills
1 Sauerman-LeRoi slackline outfit
1 Burch unloader
2 Jeffrey loaders
1 Unloader
1 Sullivan 240-cf portable compressor

PUMPS, VARIOUS TYPES

1 Fairbanks-Morse 2-inch tar pump
1 Novo 60-gallon pump
1 Mud-Hen 4-inch diaphragm pump
1 3-inch centrifugal tar pump
1 diaphragm hand pump
2 2-inch portable centrifugal pumps

DISTRIBUTORS AND SPREADERS

1 Hvass bituminous distributor
2 Chloride spreaders
1 Hercules-Ditwiler chip spreader
6 Michigan sanders
1 Studebaker wagon-trailer tar distributor

MOWERS

1 Centaur motorized mower
1 International tractor and mower
1 mowing machine

DRAGS AND HARROWS

1 Road drag
1 Drag windrow eliminator
1 Chain drag
1 Spring-tooth harrow
2 Spike-tooth harrows
1 Disk harrow

BOILERS

1 Case 35-hp portable boiler
1 Port Huron boiler
1 Bros heating boiler

MISCELLANEOUS EQUIPMENT

3 Concrete mixers
1 2-yard dump car
1 Land plow
12 Camp wagons
1 Pile driver with Clyde hoist
3 Lighting plants
2 Portable gas tanks
1 Littleford Traf-O-Mark machine
1 Joint filler and marker
1 Paint spray machine
1 Saw rig

Zoning and Parks

In addition to its responsibility for 1,245.5 miles of county highways and 139.9 miles of state highways under the maintenance contract, the Marquette County Highway Department also looks after the Marquette County Airport, three county parks, and three landing fields of the Michigan Aeronautic Department.

Marquette County is one of the first to have land-use zoning. All land within the county is placed in one of three classes: (1) Forestry, where residential use is prohibited; (2) Recreational, where residential use is permitted but commercial use is forbidden; (3) unrestricted territory.

Zoning is used chiefly to avoid the promiscuous extension of school bus lines. Were residential use permitted in Forestry areas, there would be a very large number of cases where buses would be required to transport a few children for prohibitive distances.

Line of Push Dozers Now Made by Buckeye

The development of a new line of Unitilt push dozers and push-dozer pads for use on Buckeye Unitilt bulldozer frames has recently been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio.

These units are now being built in two sizes: 24 x 61 inches for Allis-Chalmers HD-14 and HD-10-W tractors, International WTD-18 and WTD-14 tractors, and Cletrac FD Series tractors; and 24 x 57-inch units for Allis-Chalmers HD-10 and International TD-18 tractors. The Buckeye Unitilt push-dozer pads are interchangeable on the same frame with Buckeye Unitilt bulldozer and trailbuilder blades.

Further information on these units and their application may be secured direct from the manufacturer.

"FLEX-PLANE"

Finishing Machines

and

Joint Installing Machines

FLEXIBLE ROAD JOINT MACHINE CO.

Warren, Ohio

GAIN 65 TO 430% MORE LINER STRENGTH!

ARMCO Plates provide more strength with less weight. Design makes the difference.

GAGE	SECTION MODULUS		
	PER IN.	PER FOOT	PER SECT.
12	.1146	1.375	2.063
10	.1459	1.751	2.627
8	.1766	2.119	3.179
7	.1933	2.320	3.479

• Gage for gage you'll find ARMCO Heavy Duty Tunnel Liner 65% to 430% stronger (section modulus) than any other plate. Here's what this greater strength with less weight means in terms of easier, safer tunneling . . . .

On a strength/weight basis ARMCO Plates cost less at the start. You save on installation because the work moves fast. One man handles the light sections and only structural wrenches are needed for assembly. Where completed rings can be spaced to take advantage of partly self-supporting ground, you may actually buy fewer plates.

Let ARMCO Liner Plates help speed the work and cut costs. There is a wide range of sizes and gages for light or heavy duty service. Write for the whole story. ARMCO DRAINAGE PRODUCTS ASSN., 85 Curtis Street, Middletown, Ohio.

ARMCO

TUNNEL LINER PLATES

Keep the Defense Roads Open

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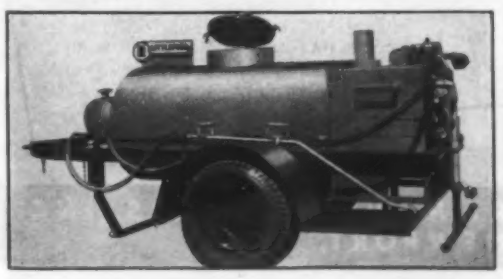
101

UTILITY SPRAY TANK



Now is the time to get our roads in tip-top shape. The Littleford No. 101 Utility Spray Tank is just the unit to do the work. Has facilities for doing three jobs—Has Spray Bar for small application work, Hand Spray Attachment for patch work, and Draw-Off Cock for crack filling. Keep our Defense Roads open with Littleford Road Maintenance or Construction Equipment.

BLACK TOP ROAD MAINTENANCE EQUIPMENT — LB — SINCE 1900

LITTLEFORD

LITTLEFORD BROS., INC.

485 E. Pearl St., Cincinnati, Ohio

Plenty of Spare Parts But Don't Hoard Them

(*Continued from page 23*)

production, depends on whether or not your need for equipment fits into the defense-construction picture. Every manufacturer will do his best to meet your needs but, generally speaking, all purchases of construction and road-building and maintenance equipment must be accompanied by a priority rating. As far as contractors are concerned, this does not present much of a problem as practically all contracts let for any type of construction will be in connection with the war effort, and they will automatically carry a priority for purchases of equipment.

State and county highway departments may face a slightly different situation. As necessary as our highway system is to the war effort, in many cases highway departments may have to make their present equipment serve the purpose if their orders for new machines do not carry a sufficiently high priority rating.

As far as new models are concerned, there will be comparatively few of them; in fact, a number of companies have reported a reduction in the number of models now being made, in the interest of standardization and conservation of materials. Some companies, such as Byers Machine Co., Flexible Road Joint Machine Co., Heltzel Steel Form & Iron Co., Richmond Screw Anchor Co., and Standard Steel Works, have announced a policy of regular improvements and refinements but no new models. Other companies, including Gardner-Denver Co., Hardsocg Wonder Drill Co., Hauck Mfg. Co., Independent Pneumatic Tool Co., Iowa Mfg. Co., C. S. Johnson Co., Keystone Driller Co., and Victor Equipment Co. are contemplating the introduction of new models. In some cases, these new models will replace or even reduce the number of present models, while in every case the question of new models is still uncertain and depends on Government regulations, shortages of materials, and similar circumstances.

Armco Drainage Products Association announces that while no new products are planned, there may be necessary substitutions due to lack of materials. For example, as its supply of galvanized sheet metal runs out, a special bituminous-coated one will be substituted. W. A. Riddell Co. reports that its production will be confined largely to motor graders, the shortage of material having necessitated the discontinuance, at least temporarily, of the manufacture of pull-type road graders and road rollers.

The Spare-Parts Situation

Naturally, when confronted by this situation of priorities, shortage of materials, and production capacities devoted to the war effort, there arises the question of how to make present equipment carry on, and whether or not spare parts will be available for this purpose.

Generally the answer is "Yes". Practically every manufacturer answering our inquiry reported that it is in a position to supply spare parts for older and present models. In some cases, a priority rating is needed to secure them; in others, the spare parts are available but manufacturers have pointed out that because of increased production effort the delivery of spare parts may not be quite as swift as in the past and have requested contractors and state and county highway engineers to try to anticipate their spare-parts needs, placing their orders sufficiently far in advance to allow the manufacturer time enough to make deliveries. Every manufacturer is anxious to give to its regular customers the very best possible service, but the present emergency is one which calls for patience and understanding of the problems of production and shipment under emergency conditions, and all the cooperation which customers can extend to manufacturers will be appreciated and reciprocated.

Don't Hoard

The great plea in connection with the spare-parts situation has been "Don't Hoard". There has been a marked tendency on the part of everyone to lay in a supply of everything which they think will be hard to secure in the future. A little of this can be classified as foresight and prudence. If carried to excess, it becomes hoarding, a selfish unpatriotic gesture which will result in hardship and perhaps disastrous delays in important work. We must all face squarely a situation which requires first things first, even at the price of inconvenience and sacrifice to us as individuals. There is no need to hoard spare parts—they are available at the manufacturers, and hoarding merely cuts down the available supply and brings about a quicker depletion of stocks.

Care of Present Equipment

This vital subject has been discussed before in these pages and will be discussed more fully in future issues. However, several manufacturers and producers of materials for use in the maintenance of equipment have emphasized the importance of this subject and it must be included in any survey of the equipment outlook for 1942.

Oakite Products, Inc., writes: "As in other industries, present or existing equipment will have to last longer. Better care will have to be taken of diesel or gasoline motors and cooling systems. More care and attention will have to be given to the protection of equipment surfaces. More frequent repair and overhaul will be essential, rather than depending on replacement of motor or other parts. In all these and many more

(*Concluded on next page*)

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and
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HOISTS—DERRICKS
WHIRLERS
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Special Equipment
Movable Bridge Machinery
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McKIERNAN-TERRY CORP.
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MORE HP HRS. PER $
for your pumps . . . hoists . . . mixers
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A gasoline engine that upholds Le Roi's reputation for dependability. • *Overhead valve arrangement* assures quick accessibility, fuel economy. *Hardened valve seat inserts* minimize need for valve adjustment. *Removable wet sleeve cylinders* assure uniform expansion and true cylinder bores. • One of a complete range of Le Roi engines — 4 to 400 horsepower. Look for — ask for — Le Roi power when you buy equipment.
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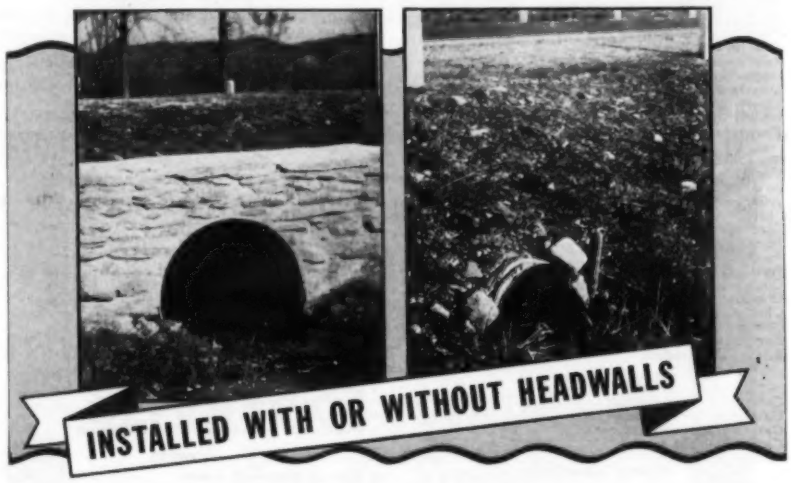
INSTALLED WITH OR WITHOUT HEADWALLS
• A casual survey of GOHI Pipe installations reveals the versatility of this superior drainage structure and its adaptability under all conditions of terrain and types of drainage requirement. Under towering fills, or barely covered, in mountainous country and in swamp land, under country lanes and city streets, safeguarding airports and athletic fields; wherever and whenever a drainage problem must be solved, there GOHI Pipe will be found "on the job," giving the lowest-cost-per-year of service.
To use GOHI Corrugated Pipe is to make sure of complete protection to highways, airports, railways, parks, athletic fields, and all other public and private improvements that must be safeguarded against the world's greatest menace — water out of control.
NEW ENGLAND BOLT CO. . . . . Everett, Mass.
CENTRAL CULVERT CO. . . . . Ottumwa, Iowa
CAPITAL CITY CULVERT CO. . . . Madison, Wis.
BANCROFT & MARTIN ROLLING MILLS CO. . . . . S. Portland, Me.
DENVER STEEL & IRON WORKS CO. . Denver, Colo.
THE LANE PIPE CORPORATION . . . Bath, N. Y.
DIXIE CULVERT MFG. CO. . . . . Little Rock, Ark.
ST. PAUL CORRUGATING CO. . . . St. Paul, Minn.
THE NEWPORT CULVERT CO. . . . Newport, Ky.
GOHI CULVERT MANUFACTURERS, INC.,
NEWPORT, KY.

Care of Equipment More Vital Than Ever

(Continued from preceding page)

operations generally associated with normal maintenance, Oakite cleaning materials are being used to facilitate and speed up this work so that equipment may be put back in service as quickly as possible, with the least expenditure of manual effort and money."

Petroleum Solvents Corp., producer of Siloo fuel-oil tank solvent for cleaning tanks and equipment and for keeping the internal mechanism of internal-combustion engines clean, also urges better care of equipment in order to keep it in working order.

Lubrication, too, is more important than ever before. In order that a contractor, state or county highway department may effect the greatest economy in machine operations, decrease maintenance costs, and extend the service life of equipment, the Standard Oil Co. of California suggests the following precautions:

1. Be sure that quality lubricants manufactured by responsible lubricant refiners are used.

2. Be sure that the lubricants used are suited for the equipment moving parts involved and for the service or load conditions under which the equipment is operated; also that the proper methods of lubricant application are employed, and that lubricants in storage are protected from dust, water, and other contaminants. Assistance along these lines can be secured by taking advantage of the technical and engineering service extended by various reputable oil suppliers.

3. Maintain regular inspection periods on equipment to ascertain that the moving parts are being supplied with sufficient lubricant to provide the necessary reduction in friction losses and that all parts are properly adjusted mechanically. Such inspections should be a matter of routine and at shorter intervals than has generally been the practice in the past.

4. Keep equipment in as clean a condition as surroundings will permit, and make certain that operators of equipment know their job.

Fiske Brothers Refining Co. and The Texas Co. also both stress the importance of these vital points. The former has just brought out an issue of *Lubriplate Film* devoted to the lubrication of contractors' equipment, while the January, 1939, issue of *Lubrication* published by The Texas Co. was devoted to the subject of lubrication in the field of contracting. Copies of these publications are available to interested readers who write to this magazine for them.

No discussion of the care of construction equipment would be complete without mentioning the care of those precious objects, tires. A complete article on this subject will appear in the March issue of CONTRACTORS AND ENGINEERS MONTHLY, but we should like to include here the fact that most of the tire companies have issued booklets or instruction sheets on the care of tires which will greatly increase their service life. Firestone Tire & Rubber Co. and the B. F. Goodrich Co. have sent us their booklets on this all-important subject, and copies may be secured from us.

What Does It All Mean?

This swift and tremendous conversion from a peacetime to a war economy and production program involves problems for us all. But the construction industry has faced problems before: in fact, its job is made up of a long and continuous series of problems, and none of the existing ones are insurmountable.

They do mean some revision in the ordinary or normal way of doing things, greater care of present equipment, an attempt to foresee requirements and complete cooperation with the war effort.

The manufacturers of construction equipment who have replied to our inquiries about the equipment outlook for 1942 have all assured us that every effort will be made to serve their customers as well as they can; but they are bound by priority rulings, shortages of materials, and government orders taking precedence over any others. The inconvenience resulting from this is one of the sacrifices we must and should be willing to make for Victory.

Herzog Joins Seaman Motors

Howard Herzog, former County Commissioner of Kenosha County, Wis., has joined Seaman Motors, Milwaukee, Wis., and will specialize in experimental and development work in the field. Mr. Herzog's many years of experience in road construction makes him particularly well suited to this type of work.

Strategic Networks For Wartime Traffic

(Continued from page 4)

sure the greatest service to defense and civilian necessities at a minimum cost and effort.

Highway officials must use their ingenuity to see that our highway system is kept to a standard that will give impetus to the speed of production for our all-out war effort. They must conserve critical materials, they must be sure that every man-hour of work on our highways is advantageously used.

For the time being all efforts should be toward winning the war and there is no better way in which the highway industry and profession can contribute than to see that the highways of the country are sufficient and adequate to take care of wartime traffic. Where it is impossible, through lack of time or facilities, to reconstruct at the present time, then heavy maintenance or betterment must be carried out.

One of the very important parts of the entire program is furnishing farm supplies. This means the secondary roads must be kept in condition or improved to meet traffic demands.

These are the minimum requirements in order to provide transportation with necessary facilities. This important program should be continued and inasmuch as it is directly coordinated with the Defense Program it should be financed, with the exception of routine maintenance, by the Federal Government; and in such spots where maintenance has been considerably increased due to the defense program, then these additions should also be borne by the Federal Government.

New Ransome Dealer

The Ransome Concrete Machinery Co., Dunellen, N. J., has appointed the McCall Tractor & Equipment Co., 3205 Harrisburg Blvd., Houston, Texas, to handle its complete line of construction equipment in certain sections of the State of Texas.

VIBER COMPANY CONCRETE
VIBRATION

MOST PROFITABLE FOR
REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

VIBER COMPANY
726 SO. FLOWER STREET
BURBANK, CALIFORNIA

MORE TONS PER HOUR
MORE ACCURATELY ROLLED BY

3-AXLE TANDEMS
THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

Highways are the arteries of the nation . . .

Build them well for our defense

Through our roads and streets flows the traffic that is the lifeblood of our wartime defense effort. New and better roads are being built and must continue to be built to link important cities and to provide a means of rapid transportation for our vital defense materials, our troops, our munitions and supplies.

You may be called upon

to rush to completion highways not even scheduled as yet. Are you prepared to meet the emergency? Do you need data on location? On design? On specifications? On modern construction methods?

AMERICAN HIGHWAY PRACTICE

VOLUME I

(Published Jan. 1942)

By LAURENCE I. HEWES

Chief, Western Region, United States Public Roads Administration

covers all these subjects, with no waste words. It starts right in with highway location, and progresses from there to design requirements and principles, grading, landscaping, sand-clay and stabilized roads, macadam roads, gravel and fine-crushed rock roads, and intermediate bituminous surfacings. (The remaining types of road surfacing will be covered in Volume II, due in May.)

461 pages; 189 illus. 6 by 9—$5.00

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440 Fourth Avenue, New York, N.Y.

Kindly send me, on ten days' approval, Volume I of HEWES' AMERICAN HIGHWAY PRACTICE. At the end of that time, if I decide to keep the book I will remit $5.00 plus postage; otherwise I will return it postpaid.

Name _____
Address _____
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CEM-2-42

Mixing and Laying Bituminous Runways

(*Continued from page 26*)

the emulsion in the mix and a thorough coating of the aggregate. The actual quantity of asphalt used was 4½ per cent of the dry weight of the aggregate mixture. The emulsion as received on the job contained approximately 60 per cent asphalt, as required by the specifications.

The specifications for the asphalt emulsion were as follows:

Viscosity-Saybolt Furol—60 cc.— at 25° C. (77° F.)	30 to 100 seconds
Miscibility	No appreciable separation in 2 hours
Modified miscibility (as described in A.S.T.M. Proceedings of 1935)	Not more than 4
Mixing	Break not more than 2 per cent
*Residue at 163° C. (325° F.) 3 hours 50 grams	55 to 65 per cent
Settlement, 10 days	Not more than 3
Sieve test	Not more than 0.05 per cent
Demulsibility 50 ml. 0.10N Ca Cl₂	Not more than 2 per cent
Dehydration at 100° F.—96 hours	Not less than 0.60

*In lieu of the requirement for residue at 163 C., the Government may substitute the following requirements:

Distillation by weight:	
Oil distillate at 260° C. (500° F.)	Not more than 2 per cent
Residue at 260° C. (500° F.)	55-65 per cent
Penetration residue at 25° C. (77° F.)	100-300
Ash	Not more than 3 per cent
Solubility in carbon disulphide	Not less than 99.5 per cent

The petroleum asphalt used in the emulsion was required to conform to the following specifications, prior to emulsification:

Penetration at 25° C. (77° F.)	100-300
Solubility in carbon disulphide	Not less than 95 per cent
Loss at 163° C. (325° F.)—5 hours	Not more than 1.0 per cent
Ductility at 77° F	Not less than 100 cms.

On the opposite side of the traveling mixer from the asphalt-emulsion truck was an underslung trailer with a large rectangular tank into which water tank trucks delivered their loads by gravity. Water was secured from a local water utility. This outfit worked 24 hours a day and Sundays to take advantage of hot dry weather which is the best for an asphalt-emulsion operation as windrows will not break satisfactorily and can not be spread properly unless hot dry weather permits the evaporation of the added moisture above the optimum moisture content of the soil when mixed with the asphalt.

Spreading and Rolling

When the windrows were mixed they contained approximately 12 per cent of liquids and this had to be reduced to between 5 and 6 per cent before the material would compact properly. Two methods of handling the spreading of the windrows were employed. In the first the windrow was flattened 24 hours after mixing, using a Caterpillar No. 12 blade because of its weight, and then cultivated by an orchard cultivator pulled by a farm tractor with pneumatic tires. The use of agricultural tools for this purpose was in line with standard practice in soil-cement work and general soil-stabilization operations.

The second method of mixing was to permit the windrow to stand for several days after mixing and then to cut it down with the heavy power blades in successive cross sections to aerate it thoroughly and mix with the blade. This method of cutting equalized the moisture which had started to dry out in the sides of the windrow and was used successfully in a number of instances when excessive moisture in the subgrade caused a definite delay in flattening and spreading the windrow.

As soon as the windrow was spread, the sheepsfoot rollers were operated to compact the material from the bottom up and then the blades were put back with the pneumatic rollers following behind them, and the final rolling was done by a Huber tandem roller. On all of this work the heavier power graders were used, equipped with leaning-wheels as they enabled them to carry a heavier load in cutting the windrow for spreading and the initial aerating.

When one 4-inch layer was completed, a power broom was used to remove all fines from the surface which were placed in the center and used in the succeeding windrow for the second 4-inch layer. The bottom layer was primed with a 1 to 9 mixture of emulsion and water after the windrow had been mixed on the lower section of the base and was ready to spread. The spreading operation of the second windrow was identical with the first as was also the rolling.

SPECIFICATIONS FOR ASPHALT USED IN THE HOT-MIX TOP

Designation	AP-1-25	AP-3-25
(1) Specific gravity (77°/77°F)	Not less than 1.00	Not less than 1.00
(2) Flash point, not less than	175°C. (347°F.)	175°C. (347°F.)
(3) Softening point	35°C. to 55°C. (950°F. to 131°F.)	40°C. to 60°C. (104°F. to 140°F.)
(4) *Penetrations at 25° C. (77°F) 100 grams, 5 seconds	100-250	85-100
(5) Ductility at 60°F c.m., not less than	100	100
(6) Loss at 163°C. (325°F.) 5 hours, not more than	1.0 per cent	1.0 per cent
(a) Penetration of residue at 25° C. (77°F.), 100 grams 5 seconds, as compared to penetration before heating, not less than	60 per cent	80 per cent
(7) Bitumen (Soluble in carbon disulphide), not less than	99.5 per cent	99.5 per cent
(a) Organic matter insoluble, not more than	0.2 per cent	0.2 per cent
(b) Inorganic matter insoluble		
(8) Oliensis spot test (Method T-102-38 A.A.S.H.O.)	Negative	Negative

*The exact penetration of the asphalt furnished under AP-1-25 shall be dependent upon the character of the asphalt and shall be designated by the contracting officer. The asphalt used shall not vary more than 20 points from that designated.

The Asphaltic-Concrete Top

After the full depth of stabilized base was thoroughly compacted, cured, and the moisture content by test was shown to be reduced below 5 per cent for the full depth, a cure coat was applied consisting of a mixture of 1 part asphalt emulsion to 4 parts of water and applied to the finished surface at a rate of 0.2 gallon per square yard. The finished surface was tested with a 10-foot straightedge and with a template cut to the required cross-section. Where hollows or high points existed equal to ¼ inch per 5 feet of distance, the surface was corrected by adding or removing material as required.

Following the prime of the stabilized base course, a 2-inch compacted thickness of hot-mix asphaltic concrete was applied to the runways, using between 4.0 and 7.0 per cent of asphalt by weight

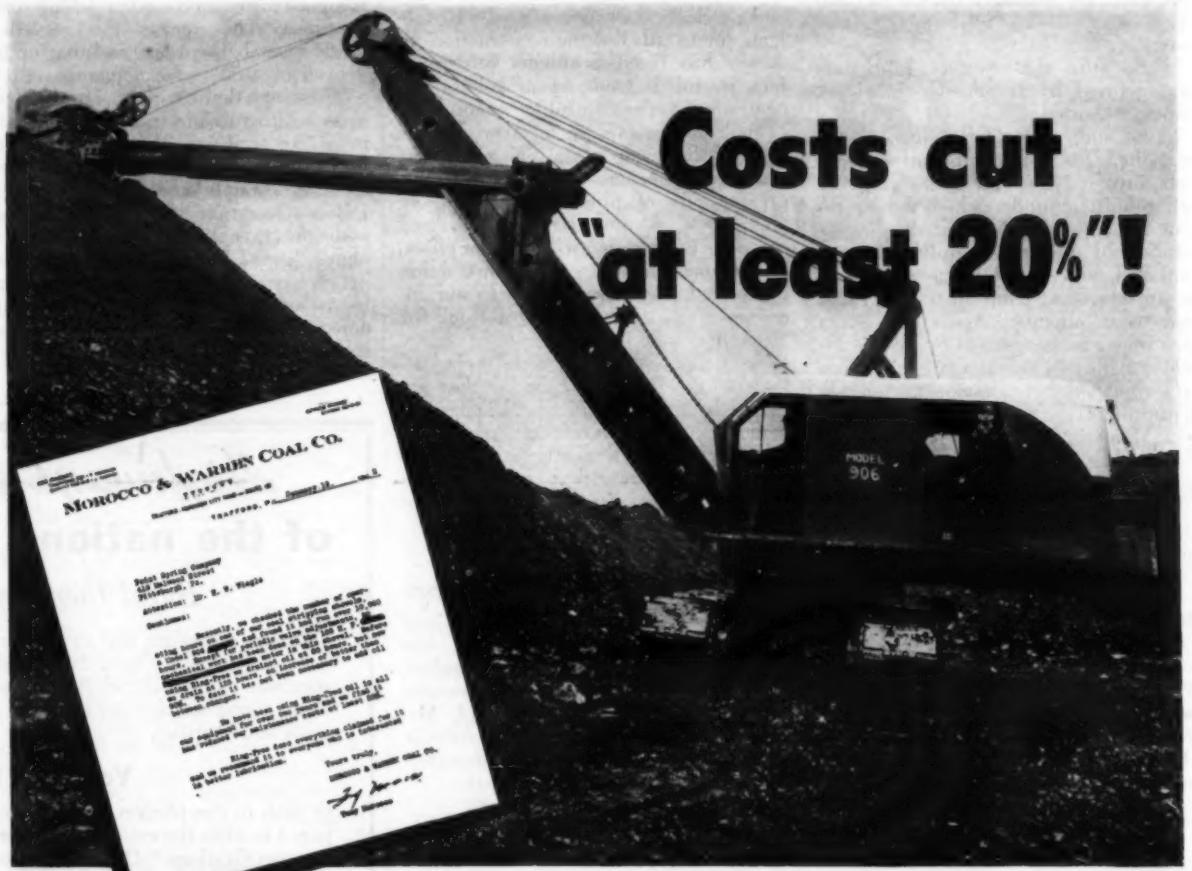
(*Concluded on next page*)

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.



"WE HAVE been using RING-FREE in all our equipment for over two years," writes the Morocco & Warren Coal Company of Trafford, Pennsylvania, "and we find it has reduced our maintenance costs at least 20%."

Recently they checked a Model 906 coal stripping shovel and found it had run over 10,000 hours with only periodic valve adjustments on the 165 H. P. motor.

"Before using RING-FREE we drained oil at 80 hours, but now we drain it at 125 hours, an increase of better than 50%. To date it has not been necessary to add oil between changes."

Then Tony Morocco adds:

"RING-FREE does everything claimed for it and we recommend it to anyone who is interested in better lubrication."

RING-FREE is the *only* oil you need for gasoline engines or Diesels. Think *how* that simplifies your lubricating work!

What RING-FREE has done for others it can do for you. Won't you write us?

• • •

MACMILLAN PETROLEUM CORP.
50 West 50th St., New York • 624 So. Michigan Ave., Chicago • 530 West 6th St., Los Angeles

MACMILLAN RING-FREE MOTOR OIL

Copyright 1942 by Macmillan Petroleum Corporation

U.S.E.D. Photo
The traveling plant mixing the asphalt-emulsion base on one of the runways at a midwestern bomber plant.

Airport Runway Paving At New Bomber Plant

(*Continued from preceding page*)

in the aggregate which was graded as shown in the table below.

SPECIFICATIONS FOR MINERAL AGGREGATES FOR WEARING SURFACE

Passing ¾-inch sieve	100 per cent
Passing ½-inch sieve	——
Passing No. 4 sieve	60-85 per cent
Passing No. 10 sieve	30-50 per cent
Passing No. 80 sieve	6-15 per cent
Passing No. 200 sieve	2- 6 per cent

The specifications further required that the coarse aggregates, above No. 10 mesh size, should be sound and tough and resistant to stripping of the asphaltic binder, and free from clay, organic matter or an excess of soft flat or elongated pieces. The fine aggregate, below No. 10 mesh, was required to be clean, hard sand or durable rough particles resistant to the displacement of asphalt in the presence of water, and also free from clay particles, organic matter or other deleterious substances. It was further required that the portion of the total aggregate passing the No. 40 sieve should have a Plasticity Index of not more than 6 and the bituminized aggregate should have a swell of not more than 1.5 per cent.

The asphalt used was required to pass the specifications shown in the table at the top of page 50.

A somewhat unusual feature of this job was the use of an asphalt of 180-230 penetration, but the experience of the Consulting Engineer on this work in using asphalts of this high penetration on work in the eastern part of the state has shown that the mixes remain tight and alive over exceedingly long periods of time. Although these runways will be used considerably as soon as the bomber plant is in production, the traffic will not be heavy and they would therefore not be submitted to the same kneading or annealing action as would a city street over which there is a continuous procession of heavy vehicles. This is another reason for the selection of the high-penetration asphalt.

The asphalt mix was prepared in a standard hot-mix plant and spread in 10-foot strips by a Barber-Greene finishing spreader. A battery of four rollers was needed to maintain compaction behind the spreader and each roller was required to roll so that its rolling overlapped at least 12 inches on the previous trip. To prevent the adhesion of the mixture to the roller the wheels were kept moistened throughout the rolling operation.

The asphaltic-concrete top was sealed as a part of the construction operation. First the surface was thoroughly cleaned with rotary brooms, and then the asphaltic seal coat was applied by a pressure distributor at the rate of 0.2 gallon per square yard, and then immediately behind the distributor and, at the longest, one-half hour after, a truck and chip spreader was backed over the seal coat spreading the ⅜-inch and smaller chips uniformly over the surface. Spotting was done with hand brooms followed by a light broom drag to obtain a uniform coverage. Immediately after the brooming the seal chips were rolled with 7-ton tandem rollers.

Personnel

All of the operations at the Aircraft Manufacturing and Assembly Plant were done under the direction of the Omaha District Office, U.S. Engineer Dept., Lieut.-Col. Helmer Swenholt, District Engineer. Frederick C. Kendall was Project Engineer for the U.S.E.D. on this work. The contract for the plant and air field was awarded to Kiewit-Condon-Woods Construction Co. of Omaha, Nebraska, for whom Henry W. Knutzen was Project Manager, and W. D. Alcorn was Assistant Field Superintendent in charge of paving. Roy M. Green of Lincoln, Nebraska, was Asphalt Consultant for the U. S. Engineer Department on the runway bases and surfaces.

Winches and Hoists

Hutchins-Maxi industrial-marine and truck winches and hoists, made by Six Wheels Inc., 1572-84 East 20th St., Los Angeles, Calif., are the subject of a new illustrated catalog recently issued by this company. Information appearing in the catalog outlines the scope of the Hutchins-Maxi line and shows the equipment at work in many different types of service. Certain models are illustrated with working drawings, and specifications are given. The manufacturer suggests that if your present winch equipment is unable to handle the job efficiently, or a special type is required to speed up operations, you consult its engineering department.

Copies of this catalog, 6-41-W, may be obtained from the manufacturer.

SPECIFY . . . . . .

HY-ROCKET Fan-Belt Driven Hydraulic Power Controls
(For Snow Plows, Road Maintainers, etc.)
MONARCH Underbody Truck Scrapers
MORCO Culvert Cleaners
HI-PRESSURE Hydraulic Hose

Monarch
ROAD MACHINERY COMPANY
328 FRONT AVE., N.W.
GRAND RAPIDS • MICHIGAN

"We Have Used This Bucket for 2½ Years and Recommend it to Anyone Who Demands Steady and Maximum Production."
THE CITY EXCAVATING CO.

"We have long since realized," writes A. J. Carlozzi, president of The City Excavating Co., Cleveland, Ohio, "that your ½ yard Multiple Rope Bucket gives us far better service than any other make previously used, and we have used several other makes of buckets."

Williams Buckets are truly "built to last and move dirt fast." Each type we build has numerous features which have been developed by over 35 years of bucket engineering for contractors, dredging companies and steel mills. Always a leader in welded design, Williams Buckets now feature welded construction at vital points, using rivets only at certain sections where ultimate replacement may be required. Make your next bucket a Williams!

Send for individual bulletins giving full information on each type of Williams Bucket.

WELDED
ROLLED STEEL CONSTRUCTION for GREATER STRENGTH and SPEED

THE WELLMAN ENGINEERING CO.
7012 Central Ave.
Cleveland, Ohio

WILLIAMS *Buckets*
built by WELLMAN

SKILSAW'S SAWING SPEED saves minutes . . . and men for QUICKER VICTORY!

SKILSAW DRILLS

For all drilling, boring and reaming in construction
Powered for deep wood boring in timbers . . . in roof truss construction, bridge building and erection of dams, superstructures and a hundred other jobs. Stronger, more durable, more powerful throughout.
23 MODELS

You need fast-cutting SKILSAW for all sawing because Time, itself, is a weapon now . . . and SKILSAW saves the minutes on every operation that mean priceless hours saved on every job. SKILSAW is faster because it is more powerful, lighter, easier-to-use . . . and its speed helps you complete projects *ahead of schedule* in spite of the present shortage of skilled hands.

Test SKILSAW on your own work TODAY! See for yourself how many sawing jobs it does . . . faster, better and *at lowest costs* . . . on wood, metal, stone, concrete and compositions. Your distributor will gladly demonstrate SKILSAW. Phone NOW!

SKILSAW, INC.
4769 Winnemac Ave., Chicago, Ill.

New York • Boston • Buffalo • Philadelphia
Cleveland • Dallas • New Orleans • Atlanta
Los Angeles • Oakland • Toronto, Canada

SKILSAW PORTABLE ELECTRIC TOOLS
★ FOR THE DEFENSE OF AMERICA ★

Unusual Pier Forms On Bridge At Peoria

(*Continued from page* 15)

ferdam.

The footings for the piers were 3 to 5 feet high with the H piles carried 1 foot into the footings.

Forms for Piers

The forms were made of ¾-inch oiled plywood backed by 2 x 6-inch studs on 10-inch centers and were in most cases used three or more times. The wales were double 2 x 6's on 36-inch centers and were held by ½-inch steel tie rods and Superior form clamps. Some of the forms were designed for a rise of concrete of 3 feet an hour and some for 5 feet an hour. The rate of rise for which the individual form was designed was maintained in part by governing the size of the batch and by pouring two forms at the same time in the case of the smaller piers.

The forms for the beam arch at the top of the two columns were held by a double steel girder on bents at the ends, consisting of two rough timber posts each. The support for the cantilevered ends of the cap or beam which projected 3 feet 9 inches beyond the piers consisted of an 8 x 8 timber clamped to the base of the pier by two form clamps, using the removable rods which had been left in place for this purpose. Above the 8 x 8 timber a pole was used, with wedges at the top to make the necessary final adjustment in elevation beneath a heavy plate which supported the form proper.

The bracing for the column forms was most complete and held them remarkably rigid. The base for the bracing was a structural steel bracket bolted to the base of the pier. It consisted of a 6 x 6 angle welded at 45 degrees to a plate bolted to the base, using bolts set in the base at the time it was poured, and at the other end welded to a 12-foot I-beam which cantilevered about 4 feet at its outer end and at the inner end was attached by another plate to the base about 2 feet from the top, using bolts previously set in place. At the outer end of the three brackets used on each side of the base a 3 x 12 timber was bolted to the brackets. Then from this 2 x 6 stiff braces were carried to the spring line of the arch and two ½-inch cables with turnbuckles were carried from the outer ends of the brackets to the first wale below the spring line of the arch. Between the two columns

(*Concluded on next page*)

Owens
CAN TAKE IT
THE OWEN BUCKET CO.
6030 BREAKWATER AVE. • CLEVELAND, O.
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.
A MOUTHFUL AT EVERY BITE

Defense Savings Pay-Roll Allotment Plan

How company heads can help their country, their employees, and themselves

voluntary pay-roll allotment plan | helps workers provide for the future | helps build future buying power | helps defend America today

This is no charity plea. It is a sound business proposition that vitally concerns the present and future welfare of your company, your employees, and yourself.

During the post-war period of readjustment, you may be faced with the unpleasant necessity of turning employees out into a confused and cheerless world. But you, as an employer, can do something *now* to help shape the destinies of your people. Scores of business heads have adopted the Voluntary Pay-roll Allotment Plan as a simple and easy way for every worker in the land to start a *systematic* and *continuous* Defense Bond savings program.

Many benefits . . . present and future. It is more than a sensible step toward reducing the ranks of the post-war needy. It will help spread financial participation in National Defense among all of America's wage earners.

The widespread use of this plan will materially retard inflation. It will "store" part of our pyramiding national income that would otherwise be spent as fast as it's earned, increasing the demand for our diminishing supply of consumer goods.

And don't overlook the immediate benefit . . . money for defense materials, quickly, continuously, *willingly*.

Let's do it the American way! America's talent for working out emergency problems, democratically, is being tested today. As always, we will work it out, without pressure or coercion . . . in that old American way; each businessman strengthening his *own* house; not waiting for his neighbor to do it. That custom has, throughout history, enabled America to get things done *of its own free will*.

In emergencies, America doesn't do things "hit-or-miss." We would get there *eventually* if we just left it to everybody's whim to buy Defense Bonds when they thought of it. But we're a nation of businessmen who understand that the way to get a thing done is to *systematize* the operation. That is why so many employers are getting back of this Voluntary Savings Plan.

Like most efficient systems, it is amazingly simple. All you have to do is offer your employees the convenience of having a fixed sum allotted, from each pay envelope, to the purchase of Defense Bonds. The employer holds these funds in a separate bank account, and delivers a Bond to the employee each time his allotments accumulate to a sufficient amount.

Each employee who chooses to start this savings plan decides for himself the denomination of the Bonds to be purchased and the amount to be allotted from his wages each pay day.

How big does a company have to be? From three employees on up. Size has nothing to do with it. It works equally well in stores, schools, publishing houses, factories, or banks. This whole idea of pay-roll allotment has been evolved by businessmen in cooperation with the Treasury Department. Each organization adopts its own simple, efficient application of the idea in accordance with the needs of its own set-up

No chore at all. The system is so simple that A. T. & T. uses exactly the same easy card system that is being used by hundreds of companies having fewer than 25 employees! It is simple enough to be handled by a check-mark on a card each pay day.

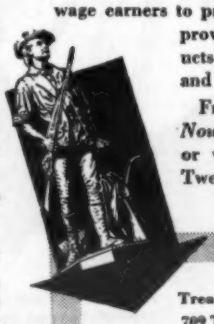
Plenty of help available. Although this is *your* plan when you put it into effect, the Treasury Department is ready and willing to give you all kinds of help. Local civilian committees in 48 States are set up to have experienced men work with you just as much as you want them to, and no more.

Truly, about all *you* have to do is to indicate your willingness to get your organization started. We will supply most of the necessary material, and no end of help.

The first step is to take a closer look. Sending in the coupon in no way obligates you to install the Plan. It will simply give you a chance to scrutinize the available material and see what other companies are already doing. It will bring you samples of literature explaining the benefits to employees and describing the various denominations of Defense Savings Bonds that can be purchased through the Plan.

Sending the coupon does nothing more than signify that you are anxious to do *something* to help keep your people off relief when defense production sloughs off; *something* to enable *all* wage earners to participate in financing Defense; *something* to provide tomorrow's buying power for your products; *something* to get money *right now* for guns and tanks and planes and ships.

France left it to "hit-or-miss" . . . and *missed*. *Now* is the time for *you* to act! Mail the coupon or write Treasury Department, Section A, 709 Twelfth St. NW., Washington, D. C.



FREE - NO OBLIGATION

Treasury Department, Section A,
709 Twelfth St. NW., Washington, D. C.

Please send me the free kit of material being used by companies that have installed the Voluntary Defense Savings Pay-Roll Allotment Plan.

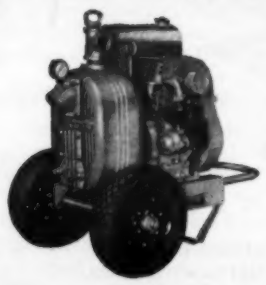
Name _____

Position _____

Company _____

Address _____

GPO 42448



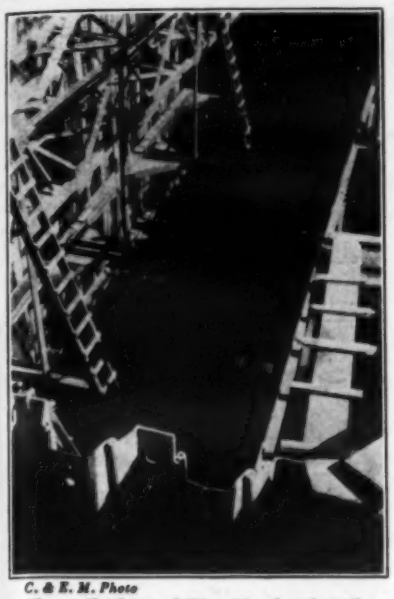
STERLING HOISTS

SIMPLE RUGGED DEPENDABLE

Yes Sir . . . you'll get extra quality, extra value and extra service with Sterling Pumps, Hoists and Light Plants . . . the choice of leading contractors everywhere. Sterling Construction Equipment on your job means increased production and larger profits.

New Bulletin "V" just issued. Be sure to write for your copy.

STERLING MACHINERY CORP.
405-13 Southwest Boulevard
KANSAS CITY, MISSOURI



C. & E. M. Photo
The cofferdam of Pier 13, showing the H-beam piles cut off to grade, the interior bracing and even the welding rods laid out on one of the I-beam cross braces.

Bridge Piers Poured From Floating Plant

(Continued from preceding page)

diagonal ties of steel cable were used with turnbuckles to make the adjustment in truing of the forms laterally.

Concrete Plant

The floating concrete plant consisted of a 100 x 40-foot steel barge with a wood false deck carrying a Bucyrus-Erie 30B crane with a 50-foot boom swinging a Williams 1-yard clamshell bucket. This crane was used to move aggregate from the 3-compartment barges which were moored alongside, carrying two compartments of coarse aggregate and one of fine. The aggregate was handled in this manner to the 2-compartment Blaw-Knox steel bins of the batching plant. A Humphreys pump mounted at the base of the batching plant pumped river water through a loop to the Smith 27-E paver. The dry batches were moved from the weighing batchers by an 18-foot belt conveyor which ran continuously, and when the skip of the paver was down the batch man released the weighed batch, which was moved immediately by the conveyor to the skip. Forward of the concreting barge a cement barge was moored, carrying approximately 1,500 barrels of cement in bags. Two of these barges were kept in service and when one was nearly emptied the second one was brought up and the shift made when concreting was not in progress.

At the front of the paver a 70-foot Insley tower and hopper was installed with a chute which delivered the concrete to a Blaw-Knox 1-yard roller-gate concrete bucket on a barge moored at the opposite side from the aggregate barge. The concrete bucket was swung by a Bucyrus-Erie 48B with an 80-foot boom. Because of limitations in swinging the boom, it was necessary for the crane to move backward and forward as each bucket of concrete was delivered to the top of the piers for pouring. The concreting crew consisted of two men in the aggregate barge, the crane operator for aggregate and an oiler, a batch man, two cement loaders, a pump man, a paver operator, the second crane operator, a tower man, a laborer spotting the bucket for loading, and two bucket men at each place of pouring into hoppers and elephant-trunk chutes. Three Roeth vibrators were used in the concrete as placed by two vibrator men. The concrete received a 1-minute mix.

When pouring seal, this plant produced 40 cubic yards of concrete per hour, but because of the limitations of handling the concrete bucket it was possible to produce only 25 yards per hour when pouring the piers. The tops of the bases of all of the piers are at a uniform elevation of 453.50. For this pour the Insley tower was used without the crane, resulting in the higher rate of production.

A 5-bag batch was used on the smaller piers and a 6-bag batch for the larger ones. The batch weights for a 5-bag batch, including the moisture in the aggregate, were 1,685 pounds of gravel, 1,025 pounds of sand and 23 gallons of water.

The major quantities involved in the construction of the substructure for the Illinois River Bridge at North Peoria are as follows:

Structural steel for ice breakers	134,004	lbs.
Class X concrete for piers	12,641.7	cu. yds.
Seal concrete	3,811.3	cu. yds.
Driving H piles	54,706	ft.
Class A excavation, dry	2,935	cu. yds.
Class B excavation, wet	14,984	cu. yds.
Earth excavation	4,700	cu. yds.
Slope wall	570	sq. yds.
Cofferdams	23	

The contractor was allowed 475 working days for the completion of the contract, which was started July 1, 1940.

Personnel

The contract for the substructure of the Illinois River Bridge in North Peoria, Ill., FAP 172, Section 15-B, was awarded to Great Lakes Dredge & Dock Co. of Chicago, Illinois. For the contractor, Carl Felitan was Superintendent and R. M. Trotter was Engineer. For the Illinois Division of Highways, V. O. Hart was Resident Engineer.

Tilting Mixer Equipped With Wide Feed Chute

The new 3½-S Smith tilter mixer is the subject of an 8-page catalog recently issued by the T. L. Smith Co., 2857 North 32nd St., Milwaukee, Wis. One of the outstanding features of this mixer is the 31-inch wide feed chute. The chute, it is claimed, provides a big target for the shovel-man to shoot at, makes loading easy as the chute is only waist high, prevents material from spilling to the ground, permits cement to be added directly from the bag, and speeds up the charging operation.

This and other construction features are described and illustrated, and specifications are given, in Catalog No. 206, copies of which may be obtained direct from the manufacturer.

(Above) Smith 56-S Tilter installed in Jahncke plant.
(Below) Jahncke's four new No. 2 Smith-Mobiles.

Dependability COUNTS!

Old Smith Tilter Customer Orders Fleet of 4 Smith-Mobiles

The Jahncke Ready-Mixed Concrete Co., New Orleans, recently purchased four Smith-Mobile Truck Mixers. Why? Because they liked the HIGH DISCHARGE — the handy FEED CHUTE — the VISIBLE MIXING feature? Yes, but primarily because of the excellent, all-around performance of the Smith Tilting Mixers which Jahncke has been using for many years.

Jahncke knew that Smith-Mobiles were designed, built and guaranteed by the same company that built the famous Big Smith Tilters . . . knew also that Smith Engineers had a reputation at stake. They wouldn't dare put out an inferior product. No doubt about it, you can buy Smith-Mobiles with confidence . . . hundreds are now in successful operation . . . so why gamble with new, untried truck mixers?

The T. L. SMITH COMPANY
2869 N. 32nd St., Milwaukee, Wis.

SMITH-MOBILE *The Original High-Discharge* TRUCK MIXER & AGITATOR

Cut MIXING Costs

Low cost production is important and essential to the successful contractor. H & B Bituminous Mixing Plants, both portable and stationary types, are designed with this problem foremost in mind. That the solution has been found is evidenced in the large proportion of Hetherington & Berner equipment to be found on the job today.

Your Inquiries Are Solicited

H&B Hetherington & Berner Inc. 701-745 KENTUCKY AVENUE INDIANAPOLIS, INDIANA
ENGINEERS AND MANUFACTURERS

TARPAULINS
ROAD MATS ★
WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and prices are right.
If your dealer can't supply you write our nearest plant for catalog, samples and price list.

write for prices

Fulton Bag & Cotton Mills
Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS NEW YORK NEW ORLEANS KANSAS CITY

The Whiteman concrete rodding machine.

New Portable Screed For Hangar Floors

One of the most difficult operations in the laying of concrete floors, whether in buildings or airplane hangars, is screeding or rodding. The Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles, Calif., has announced the development of a new portable concrete screed or rodding machine which has been given thorough tests on some of the largest jobs in Southern California.

The screeds of the new Whiteman machine ride the headers or side forms and make 5-inch transverse strokes in opposite directions. During the power-driven transverse movement of the screeds a steady pull forward by the operator provides a uniform rate of advance. This leaves a pour of even a 1-inch slump concrete simultaneously leveled and vibrated ready for final finishing.

Complete information on this machine may be secured direct from the manufacturer by referring to this descriptive item.

Electric Power Plants Of 7½, 10 and 15 KW

Newly designed Katolight power plants are now available in 7½ and 10-kw sizes at 1,200 or 1,800 rpm and in 15-kw size at 1,800 rpm. These models are available in two styles, either self-excited or with separate exciter attached. The self-excited type can be made self-cranking by connecting to 18 or 24 volts of battery. Remote control may be added at any time when the plant has a self-excited type generator.

The separate exciter generator is mounted on the outer end of the alternator end bell, and the exciter armature is carried on a tapered shaft extension of the main generator shaft. The dc brushes are easily accessible, and both frame and armature are easily removed.

The engine is of the 4-cylinder 4-cycle water-cooled type with radiator, fan and centrifugal pump, as well as governor with variable speed control, pressure lubrication system, oil filter, screen-type air cleaner, 12-gallon fuel tank, gasoline filter, high-tension magneto, and other accessories all enclosed in a heavy-gage sheet steel housing.

The driven end of Katolight armatures on all 4-cylinder plants is carried on a pilot bearing which keeps the armature core centered up or concentric with the engine crankshaft. The pilot bearing does not turn, and permits angular misalignment without stress on the bearing and shaft. Torque is transmitted from engine to armature through heavy driving pins which are set in rubber bushings with metal liners.

Further information on these new Katolight plants may be secured direct from the Kato Engineering Co., Mankato, Minn., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Fellowships for Study Of Structure Welding

The Structural Steel Committee of the Welding Research Committee, Engineering Foundation, which was organized for the purpose of carrying out research which will result in a more rational development of the use of welding in structural work, has established three fellowships at Lehigh University, Columbia University, and Carnegie Institute of Technology for the year commencing October 1, 1941. The American Institute of Steel Construction is one of the contributors to the funds of the Committee and other contributions are furnished by industry, by the Bureau of Yards and Docks of the Navy Department, and by the ASCE.

According to an announcement from the American Institute of Steel Construction, the investigation at Lehigh University is organized for beam-to-girder and beam-to-column connections of flexible, semi-rigid and rigid types of building construction. The investigation at Columbia University of the efficiency of butt joints with through-plate stiffeners has progressed to the completion of physical tests on beams and supplementary specimens. The equipment required for impact tests to determine the value of butt welds for splicing H-sections has been installed.

At Carnegie Institute of Technology the program will cover the capacity of load bearing welded plate stiffeners for plate girders compared with riveted-angle stiffeners.

A.E.D. Convention Largest in History

The Associated Equipment Distributors' Twenty-Third Annual Convention, held in Chicago January 12-14, was the largest in the organization's history, with 626 registrations, of which 302 were A.E.D. members.

The following officers were elected for 1942: President, T. W. Harron, Harron, Rickard & McCone Co., San Francisco; First Vice President, E. P. Phillips, Phillips Machinery Co., Richmond, Va.; Second Vice President, G. W. Van Keppel, G. W. Van Keppel Co., Kansas City, Mo.; Third Vice President, H. O. Penn, H. O. Penn Machinery Co., New York City; Treasurer, R. R. Nixon, Nixon, Hasselle Co., Chattanooga; Executive Secretary, C. F. Winchester, National Press Bldg., Washington, D. C.

Regional directors include William Danner, Parker-Danner Co., Boston; H. O. Penn, H. O. Penn Machinery Co., New York; James C. Alban, Alban Tractor Co., Baltimore, Md.; E. P. Phillips, Phillips Machinery Co., Richmond, Va.: A. E. Hahnan, Tractor & Machinery Co., Atlanta, Ga.; Chas. O. Finn, Finn Equipment Co., Cincinnati; B. C. Patten, Patten Tractor & Equipment Co., Chicago; G. W. Van Keppel, G. W. Van Keppel Co., Kansas City, Mo.; R. S. Rosholt, Thorman W. Rosholt Co., Minneapolis; G. A. Cooper, J. E. Ingram Co., San Antonio; T. W. Harron, Harron, Rickard & McCone Co., San Francisco; and Frank B. McBath, Columbia Equipment Co., Portland, Ore.

Members of the Board of Governors were appointed as follows: Chairman, W. G. Morgan, Geo. F. Smith Co., St. Louis, retiring president; A. F. Sersanous, Loggers & Contractors Machinery Co., Portland, Ore.; J. S. Gilman, Wm. F. Ziegler Co., Minneapolis; M. R. Hunter, Hunter Tractor & Machinery Co., Milwaukee; G. F. Lowe, Lowe Machinery Co., Chicago; F. W. Mattheis, Hedge & Mattheis Co., Boston; and R. R. Nixon, Nixon-Hasselle Co., Chattanooga.

YOUR GRADER CALENDAR for 1942

Grader	No. 101		No. 201	
Motor H. P.	Gasoline 64	Diesel 68½	Gasoline 46	Diesel 50
Weight * single drive / double drive	19,800	20,800	15,100 / 17,400	15,600 / 17,900
Length	26'2"	25'2"	25'2"	25'2"
Blade length	12'	12'	12'	12'
Frame weight per ft. lbs.	92	92	84	84
Reversible blade	Yes	Yes	Yes	Yes
Frame type	Box	Box	Box	Box
Bulletin	No. 253		No. 254	

* Less scarifier.

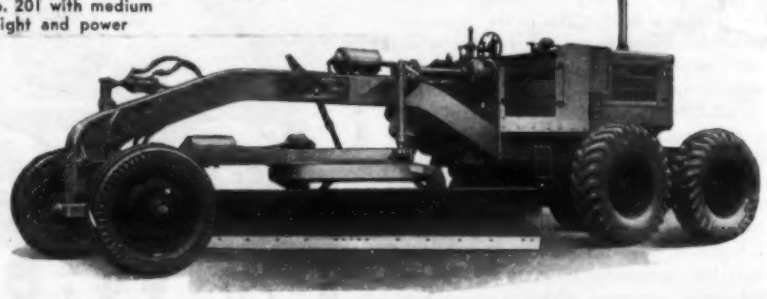
And like any good calendar, Galion motor graders are good any day in the year, 24-hour service any time you want to put them to the test. The chart above gives interesting data on two powerful heavy duty motor graders. Other features include: all-gear driven double drive, centralized hydraulic control including steering, wide front axle, full revolving circle and leaning front wheels.

For general maintenance Galion builds the light weight No. 401 with gasoline power and single drive only—bulletin No. 255. Additional data on Galion motor graders sent upon request.

THE GALION IRON WORKS & MFG. CO.

GALION - - - - - - - - - OHIO

No. 101 with maximum weight and power
No. 201 with medium weight and power



RENEWABLE TRACTOR WHEEL RIMS

Operators the country over are lowering costs and multiplying the life of their Caterpillar Tractor drive sprockets and idler wheels with renewable rims, pictured herewith. Simple instructions for laying out, trimming and welding are furnished with each shipment. Order today — or write for information.

Available for most models of CATERPILLAR TRACTORS

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23RD ANNUAL CONVENTION
ASSOCIATED EQUIPMENT DISTRIBUTORS
EDGEWATER BEACH HOTEL CHICAGO JANUARY 12-17, 1942
PHOTOGRAPH BY CONTRACTORS AND ENGINEERS MONTHLY
EDGAR J. BUTTENHEIM PUBLISHER

The record-breaking A.E.D. luncheon of distributors and manufacturers. See facing page for the list of new officers of the Associated Equipment Distributors

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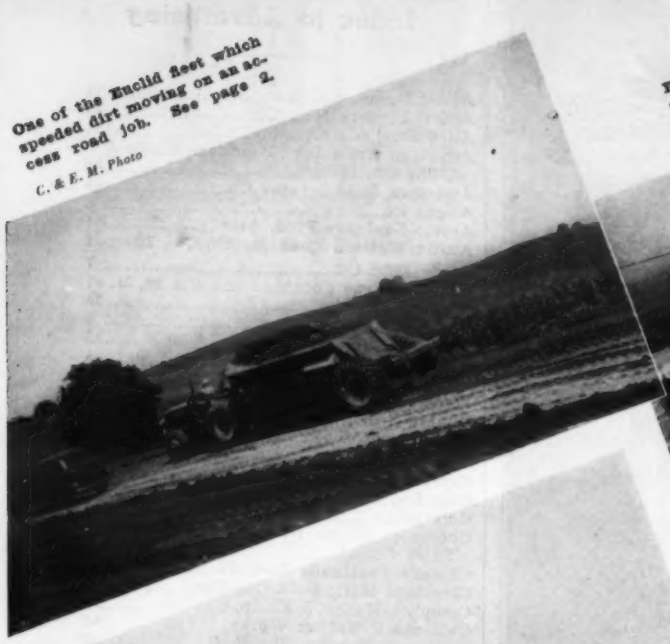
Contractors and Engineers Monthly



One of the Euclid fleet which speeded dirt moving on an access road job. See page 2.

C. & E. M. Photo

Preparing to pave a midwest access road. See page 2.

C. & E. M. Photo

At left, a Ford V-8 utility truck, with a heavy pipe frame welded at the front and a Beebe hand hoist mounted behind the cab, hauls forms ahead for concrete paving on an access road leading to a bomber plant in the midwest. See page 2. Below, asphalt runway paving at the bomber plant. See page 2.

U. S. E. D. Photo

Above, tank trucks delivering bulk cement to the mixing plant in which the soil-cement base was prepared for a 6.3-mile soil-cement base and black-top surfacing contract in California. Right, a truck dumping soil on the grating above the hopper from which it was conveyed to the automatic batcher on the Mittry Bros. contract. See page 2.

C. & E. M. Photo

The new dual highway on the Gulf Shore at Pass Christian, Miss. This is a part of Mississippi's highway program to replace gravel roads with high-grade asphalt and concrete highways. See page 11.

C. & E. M. Photo

The offices of the Marquette County Highway Department at Ishpeming, Mich. See page 2.

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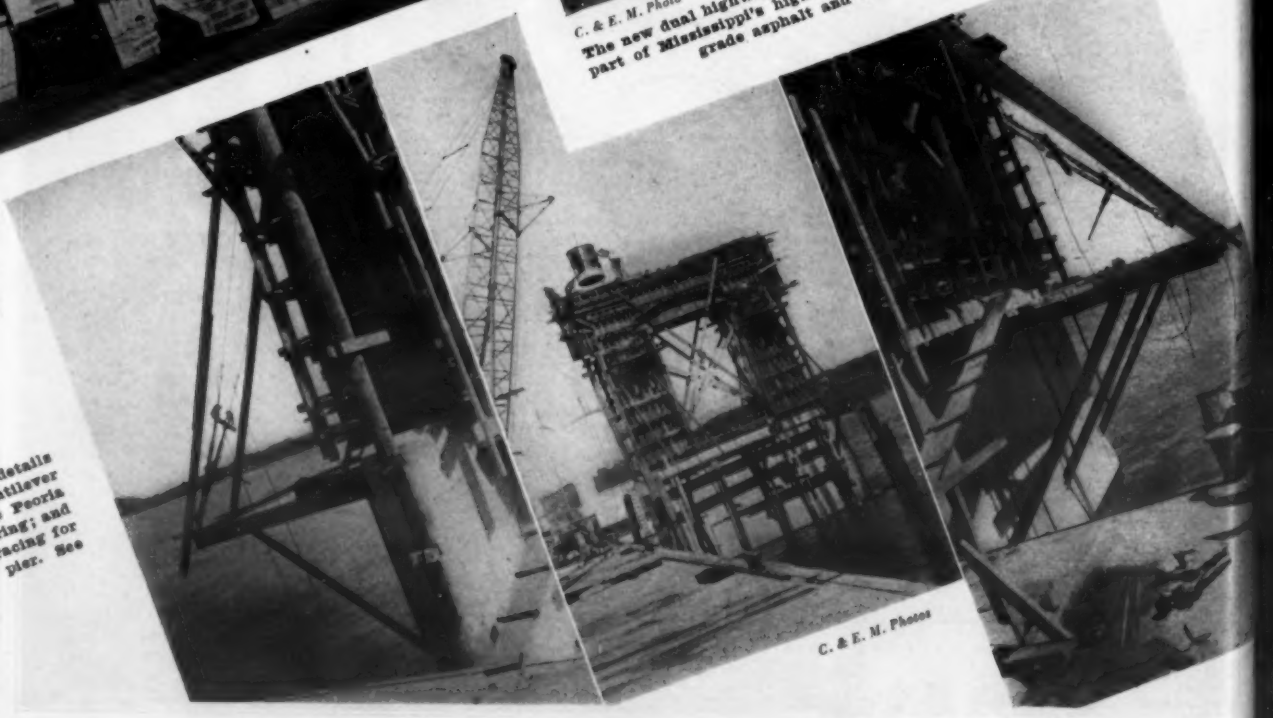
The first photo at the right shows the details of support for the forms for the cantilever section of the cap on Pier 18 of the Peoria Bridge; the middle one, concrete pouring; and at the extreme right, the exterior bracing for the column forms on the same pier. See page 15.



C. & E. M. Photos